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ABSTRACT

A project was conducted in North Carolina to identify mathematics competencies in three selected vocational programs: consumer and homemaking education, business and office education, and marketing and distributive education; to develop subcompetencies to reflect the mathematics skills implied in the identified competencies; to validate the subcompetencies; and to develop training and dissemination activities related to the competencies. An advisory committee was formed and chose 12 teachers (6 mathematics teachers and 2 each from the 3 vocational areas) to participate in the project. The 12 teachers met with a leader for two day-long sessions at East Carolina University to identify vocational competencies that require mathematics skills, to develop subcompetencies, and to develop a matrix of mathematics competencies identified in the vocational competencies. The materials were subsequently validated by a sample of 444 students, parents, teachers, and business persons, who agreed strongly that the revised programs included a great deal of mathematics content. Besides a description of the project, this paper includes (1) a list of vocational competencies that have been identified as having mathematics skills associated with specific tasks/outcomes performed in each of the vocational courses, (2) subcompetencies for each competency statement identified as having implied mathematics content, (3) a matrix that illustrates the required mathematics skills for each of the selected vocational courses, and (4) an annotated bibliography of selected references and curriculum materials. (KC)

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MATHEMATICS COMPETENCIES IN VOCATIONAL EDUCATION

Business and Office Education

Consumer and Homemaking Education

Marketing and Distributive Education

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INTRODUCTION

Mathematics and science are presently enjoying a relatively strong position in the hierarchy of education priority. This is a direct result of the recurring interest in basic skills shown by the public, mass media, governmental agencies and special commissions which have assessed the status of education in our society today. There is a general feeling in the United States that students are having difficulty in the basic skill areas of communication, science and mathematics. The decline in test scores by youth is seen as evidence of this difficulty. These test scores and other indicators tend to support the widespread belief that young people are graduating from high school without adequate reading, writing, problem-solving and mathematics skills (Smith, 1981). If this is true and information from national studies is accurate, the status position that the United States has held in technology may begin to slip embarrassingly and dangerously, challenging the country's ability to survive as a leader in this crucial area (Wirszup, 1984).

The evident problem coupled with public interest has prompted the educational community to give more attention to the study of basic skills including science and mathematics education. Educators at all levels are attempting to include mathematics and science in their educational programs (Truxal, 1984).

All of the interest and attention is both timely and well deserved, for mathematics and science education is education for living. Although these subjects have long been considered to be mainly for the "academically elite," we are now beginning to realize that they are also an important part of the practical education needed by all students. Subsequently, mathematics and science should be accepted as basic academic skills, skills essential for optimum efficiency in carrying out social, consumer, economic and occupational responsibilities required of today's citizenry. It follows that educational institutions should be expected to provide broad and sequential experiences to

help learners develop the basic computational and scientific skills needed to function in an advanced technological society (Long, 1980).

The acquisition of mathematics and science-related skills is highly related to subsequent vocation development. Some authors (Evans, 1973; Long, 1980; Mangum, 1975; Smith, 1981; and Snydam, 1976) suggest that science and "mathematics instruction, among other things, should be basic to, supportive of, and allied with curriculum directed toward the development of vocational and occupational specialties (Long, 1980, p. 1)." Thus, the twofold purpose of this project was to design and implement a program to assess the mathematical skills included in selected vocational education programs in North Carolina and to develop competency statements which will reflect these skills.

Significance of the Study

Many students have a general fear of mathematics and science. Contributing to this fear is the perception that mathematics and science are inherently difficult and boring. Most students do not take a science or mathematics course after the tenth grade and only a small percentage of the available pool of students takes a mathematics course beyond the required introductory course (Long, 1980). Yet many individuals believe we are living in a society of increasing complexity in which the need for mathematics and science skills is growing, not decreasing (Wirszup, 1984). Consequently the youth of today are being urged to remain in school to achieve the competencies which will be needed in an advanced and technologically sophisticated world.

As a more diverse population of students is introduced to more indepth mathematics and science instruction, the need for an improved and different method of presenting this information may become even more evident. The Educational Commission of the States (cited in Secondary Vocational Education's Math and Science Contribution, 1982) in the report, "Education for a High Technology Economy," concluded that to achieve educational excellence, the emphasis on improvement of mathematics and science must be at all levels and in

all programs in the educational system. The Commission further argued that "...it is essential that more opportunities be provided for acquiring in-depth information and 'hands-on' experience with the problems and the possible solutions" (p. 2). In fact, it would seem that the appeal of mathematics may be increased, and fear or apathy may be remitted by demonstrating the relevance of mathematics subject matter to practical, everyday application in the marketplace and world of work (Long, 1980; Truxal, 1984).

There appear to be a number of factors operating to make vocational education one of the best arenas for the rapid development of communication, mathematics and science skills. First, it seems that the public is becoming more receptive to the importance of the vocational experience. In a 1984 Gallup Poll (cited in The National Commission on Secondary Vocational Education) survey of the public's attitude toward public schools, eighty-three percent of the respondents thought vocational education should be required for students not planning to attend college. This was about a twenty percent increase over a 1981 survey. Thirty-three percent felt students going to college should also be required to take a vocational course. In discussing this issue, Gene Bottoms (1984) of the American Vocational Association emphasized that in the context of education, "vocational education becomes an alternative approach to learning, one that allows students to use their academic knowledge and skills to master the practices in an occupational area. It can do for many students what the college-bound curriculum does for the student who plans to be a mathematician, a scientist, or an engineer" (p. 11). The Education Commission of the States confirmed this position in its third goal statement which calls for the "recognition of the vocational preparation needs of all students, including gifted students, as well as vocational requirements for middle-range skilled positions" (cited in Secondary Vocational Education's Math and Science Contribution, 1982, p. 2).

In keeping with a progressive education/open-classroom tradition, vocational education provides a range of options for the systematic application of basic skills in real-life practical settings unparalleled in traditional classrooms. Small class size, extended class periods and the personal contact they afford provide the vocational educator with an opportunity for thoroughly understanding academic deficiency and offers an ideal opportunity for meeting these needs in a manner that is unmatched in other settings. With the development of strong systems approaches and needs assessment techniques in vocational education, the diagnosis of problems and prescriptive teaching to eliminate weakness becomes more practical than in traditional academic classrooms (Mrachek, 1984).

Finally, school districts throughout the country have set minimum competency standards in mathematics. These standards become requirements for graduation. Vocational education must begin to address itself to the mathematics determined to be important by these educational agencies.

It is important to indicate that there are several important areas that will be affected by the products developed as a part of this project that will extend far beyond the limits of the current project. First of all, the developed materials will be useful tools in stimulating the development of instructional approaches and resources for including mathematics in the vocational education curriculum. Secondly, personnel of mathematics and vocational programs should profit from collaborative experiences which promote awareness of the levels of mathematics required in vocational and occupational areas.

The dissemination of project results should do much to make the public aware of the role vocational education plays in helping students acquire fundamental, mathematics skills. Thus, vocational education should be more readily seen as one of the viable options for delivering mathematics instruction to learners. Some states' agencies have begun to respond to this role by allowing basic skills credits for work done in vocational education. The Virginia

Board of Education has shown recognition of the complexity of vocational mathematics and science by approving a vocational alternative for one mathematics or science course. A mathematics or science requirement may be met in the 20-credit diploma program by completing a sequence of courses for occupational preparation in agriculture, business, distribution, health occupations, occupational home economics and trade and industrial education. Persons representing other vocational programs are continuing to work closely with mathematics and science personnel to prepare their alternative programs (Brown, 1984).

Purpose

The objectives of the project were to:

1. Identify mathematics competencies covered in three selected vocational programs: Consumer and Homemaking Education, Business and Office Education, and Marketing and Distributive Education.
2. Develop subcompetencies to reflect the mathematics skills implied in identified vocational competency statements.
3. Validate the accuracy and effectiveness of developed subcompetencies for reflecting the mathematics content and instruction in identified vocational courses.
4. Develop a training/dissemination paper which will include:
   a. Background and procedural information
   b. A list of vocational competencies that have been identified as having mathematics skills associated with specific tasks/outcomes performed in each of the vocational courses
   c. Subcompetencies for each competency statement identified as having implied mathematics content
   d. A matrix which illustrates the required mathematics skills for each of the selected vocational courses
   e. An annotated bibliography of selected references and curriculum materials

5. Provide training for a selected group of vocational education personnel in instructional utilization of the developed material and approaches.

In addition to the objectives related to the development, training and dissemination purposes of the project, the researchers felt that it was important to collect data to verify the effectiveness of the developed material. Statistical analysis was used to test the hypothesis that there will be no significant differences between the perception of mathematics content covered in vocational courses by subjects who review current vocational competency statements and the ratings by subjects who review revised mathematics competency statements.

Procedure

The first step in the project was to select an advisory committee. The committee consisted of chief consultants of the vocational programs concerned, regional coordinators, local directors, high school teachers and teacher educators.

The committee served both an advisory and evaluative function. Joint meetings of the advisory committee and project directors were scheduled at the beginning and near the end of the project. Quarterly reports were sent to the committee members to keep them advised of progress and to offer opportunities for further input.

The chief consultants of the three vocational areas selected two courses to be analyzed for mathematics content. They also supplied the competency lists for the identified courses. Teams of knowledgeable mathematics and vocational teachers in eastern North Carolina were selected to work together to identify, analyze and develop subcompetencies which reflect the mathematics content in each of the three vocational areas. The teachers were selected based on the recommendations fo program consultants, teacher educators and other teachers. A mathematics teacher educator served as the leader for this phase

of the work. Workshop participants included twelve high school teachers (six) mathematics teachers and two teachers each from Consumer and Homemaking Education, Business and Office Education, and Marketing and Distributive Education).

The teachers and leader met in two all-day sessions on the East Carolina University Campus. The sessions proceeded as follows:

a. Overview and orientation

b. Review of mathematics goals and performance indicators

c. Review of vocational education goals and performance indicators

d. Identification of vocational competencies which require mathematics skills

e. Development of necessary subcompetencies using mathematics terminology to convey the content in the identified competencies

f. Development of a matrix of mathematics competencies identified in the vocational competencies

The materials developed were reviewed by vocational and mathematics teacher educators to validate the accuracy of the content covered.

The effectiveness of the developed subcompetencies for conveying the mathematics content covered in the identified vocational program was assessed by administering an instrument to subjects representing business, parents, teachers and students. Each group of subjects completed the instrument before and after reviewing the two sets (current and revised) of vocational competency statements.

The RFP requested that a useable training/dissemination paper be developed which would be helpful to teachers and other vocational personnel. This material is included in this booklet. It was further required that at least 150 vocational education persons be trained in the use of the materials developed.

The standard State Department of Public Instruction training session evaluation device will be used to assess the effectiveness of training/dissem-

ination workshops. Frequency and percentages will be used to evaluate the reaction of the participants to the developed materials and the training/ dissemination workshops. A positive response of fifty-one percent and above will denote a favorable rating.

Findings

Since an important purpose of the project was to involve a number of persons, a sample of 444 students, teachers, parents and business persons was used to validate the materials. Table 1 describes the subjects involved in the study.

Table 1: Sample Size and Characteristics of Subjects

	Business and Office				Home Economics				Marketing and Distributive			
	Original		Revised		Original		Revised		Original		Revised	
	N	%	N	%	N	%	N	%	N	%	N	%
Sex												
Female	41	54.7	28	57.1	52	61.2	80	69.6	36	54.5	28	52
Male	34	45.3	21	42.9	33	38.8	35	30.4	30	45.5	26	48
Representation												
Students	48	64	38	77.6	63	74.1	90	78.3	49	74.2	35	64.8
Business	9	12.0	8	16.3	8	9.4	10	8.7	10	15.2	2	3.7
Educators	18	24.0	3	6.1	14	16.5	15	13.0	7	10.6	17	31.5

The subjects' perception of the mathematics content was determined by their response to the questionnaire item: "I feel that _____ courses taught in high school include a great deal of math content." Before reviewing the business and office education materials, 87.9% (109) of the combined pretest, subjects responded positively to this item; whereas, 90% of those reviewing the original competency statements agreed and 95% of those reviewing the revised materials agreed. It appears that the subjects already had a generally positive perception of the mathematics included in the business and office program; however, the gain in posttest rating does seem to indicate that the revised materials were effective in influencing their perception.

The findings seem to indicate that prior to review of the home economics material subjects had a limited perception of the mathematics included in this program. Fifty-eight percent of the combined pretest subjects (200) responded positively to the item. Fifty-one percent gave a positive rating after review

of the original statements and 60.9% rated the revised materials positively. However, when only the treatment data were analyzed, the difference is more apparent and positive with 44% of the pretest sample agreeing and 60.9% of the posttest sample agreeing.

Of the subjects involved in review of the marketing and distributive education materials, 65.8% of the pretest subjects agreed that this program included a great deal of mathematics content. After review of the original materials, 66.7% agreed and 90.7% agreed after review of the revised material. The data would tend to imply that the materials did make a significant difference in the perception of the subjects in this area.

Table 2 summarizes the subjects' perception of the kinds of mathematics included in each of the courses before and after review of the materials.

Table 2: Perception of Kinds of Mathematics Taught in Selected Vocational Courses

Course	Business and Office								Home Economics								Marketing and Distributive							
	Original				Revised				Original				Revised				Original				Revised			
	Pretest		Posttest		Pretest		Posttest		Pretest		Posttest		Pretest		Posttest		Pretest		Posttest		Pretest		Posttest	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
General Math	65	87	80	107	35	71	54	110	62	73	85	100	75	65	115	100	39	59	65	99	28	52	54	108
Algebra	13	17	74	99	20	41	35	71	14	17	65	77	30	17	83	72	9	14	39	59	7	13	34	63
Consumer Math	42	56	21	28	30	61	19	39	60	71	13	15	70	61	18	16	37	56	12	18	41	74	13	24
Geometry	4	5	43	57	8	16	30	61	6	7	79	93	10	9	73	64	6	9	45	68	6	11	33	22

A similar pattern resulted for all the courses. The competency materials seemed to have been effective for increasing the perception of the kinds of mathematics included in these courses except in the area of consumer mathematics.. An adverse effect on the perception seemed to have actually occured in relation to consumer math.

It was determined that, overall, the revised competency materials were effective in improving the perception of the mathematics included in selected vocational courses. It also appears that they can be used successfully as a tool to increase the visibility of this content in the business and office, home economics, as well as the marketing and distributive education programs.

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USE OF MANUAL AND TRAINING MATERIALS

Rationale of Training Design

The purpose of this section of the manual is to aid in using the developed materials. Recognizing that curriculum materials tend to be more effective when users have an integral part in the development and adaption of the materials for specific groups, no attempt has been made to recommend specific instructional strategies. Rather, to provide the vocational educator with a "starting place" in planning, a comprehensive list of mathematics skills and subcompetencies has been developed for each of the selected courses. Thus, the materials and the training have been designed as a model for curriculum development rather than a prescription. Ideally this method will help vocational educators learn a process that can be used regardless of changing curricula.

Use of Training Materials by State Staff, Local Administrators and Workshop Leaders

The manual provides a step-by-step guide for the implementation of a workshop or it may be used in one-to-one training sessions with individuals. It is planned to provide assistance to vocational and mathematics educators--administrators, teachers and counselors--in two ways: first, in identifying their responsibilities in promoting the instruction of mathematics in vocational education and second, in conveying information regarding mathematics in vocational education to the general public.

The training and materials may be used in several ways:

1. As a means for designing and supporting materials for workshops for educational personnel
2. As a basis for development and coordination of classroom activities by vocational and mathematics teachers
3. As stimulus materials for the adaption and design of other activities or materials which can assist vocational educators (curriculum

materials, recruitment information, public relation packets)

4. As resources for the preservice education of mathematics and vocational educators (Kaser, 1978)

Use by Vocational and Mathematics Teachers

The ultimate goal of the project is to improve teacher instruction and thus the education of vocational educational students. The involvement and implementation by teachers is therefore vital to the success of the training and the materials. The project staff hopes that training leaders will assist teachers with implementing the process of using these materials.

Most curriculum developers agree that there are at least three basic steps in curriculum development which must be considered in planning instruction. The first task is the statement of objectives. Using the competency statements and subcompetencies, the teacher can develop specific performance objectives based on student needs.

The next task is the development of activities and experiences in which students will be involved. The key to success in this second task is to select situations to facilitate this process. A passive, lecture-response situation is not likely to contribute to a successful experience for vocational students who often perceive mathematics to be a difficult subject. Kenneke, in Mathematics in Occupational Education (1980), states that the semiconcrete and abstract modes are over-emphasized in teaching mathematics. He suggests that activities must provide concrete experiences to help vocational students grasp the meaning of mathematics. Vocational courses offer unlimited possibilities for alternative strategies to those found in the mathematics classroom.

The third task is for teachers to devise techniques for evaluating the development of students and the program. Hopefully, teachers will also be able to clearly illustrate the value of including mathematics in vocational courses.

Because vocational educators will seldom be experts in mathematics,

utilizing the talents of mathematics teachers is of utmost importance to the success of these curriculum materials and the training process. Ideally, personnel from both areas will work together for coordination of resources, content and coverage.

Development of Competency Materials

An extensive listing of skills and subcompetencies has been included to illustrate not only what is currently being taught in the selected courses, but to show the breadth and diversity of mathematics content which can be taught or reinforced in vocational programs. Of course, all such content cannot be covered, so these competencies can be realized only in degrees and levels relative to the teacher, student and the instructional competency. But perhaps the listing may spur vocational educators to define the scope of mathematics found in their selected courses and set reasonable parameters.

Format of Competency Statements

The format used was selected to facilitate the use of the competency statements by teachers and includes the following components:

1. Competency Statements

   Competency statements are taken from those distributed by the Division of Vocational Education, State Department of Public Instruction (1980) and can be found in Competency Goals and Performance Indicators K-12, Vocational Education Supplement VEC-1980. Competency statements appear exactly as printed except for editorial changes necessary for format consistency.

   During the research activities for the project, competency statements for Distributive Education courses were also taken from the above source. Since the field test stage, however, a new list of competency statements has been identified for the Marketing course. The project staff and a workshop Distributive Education teacher

acting as consultant used the workshop materials to match mathematics skills and subcompetencies from the "old list" to the competencies specified in the new list for the Marketing course. This revised list was not field tested.

2. Mathematics Skills

The mathematics skill statements indicate the mathematics skill needed to accomplish the identified vocational learning task. These have been extrapolated from the mathematics competencies listed in Competency Goals and Performance Indicators (Department of Public Instruction, 1980).

3. Subcompetencies

These are the task statements generated from the merger and refinement of the original vocational education competency statements and the mathematics competencies and/or skills implied. In developing these materials, the project staff had to establish certain procedures to delimit the scope of the materials. In making procedural decisions, careful deliberation was given to suggestions from workshop and advisory committee members. Selected examples of procedures followed are given below:

-Subcompetencies identified for the "old list" of Distributive Education competency statements were grouped as seemed appropriate under the new, more general competency statements developed for the Marketing course. Some subcompetencies that could not be readily recategorized were left off the new list.

-Where the original competency statements for a course included specific mathematics competencies which seemed to have been designed to reflect the mathematics content covered, no additional attempt was made to restate that content in the form of subcompetencies.

4. Revised Competencies

The term "revised competencies" is used when the original competency statement has been only slightly reworded to more clearly reflect the mathematics content indicated.

Use of the Matrix

The matrix has been developed as a visual tool to be used by vocational educators in discussing the mathematics skills included in each of the selected programs. It should be most helpful in illustrating to the general public and educational policy makers the amount of mathematics content that is possible in vocational education instruction.

Bibliography of Curriculum Materials

A major task of the project staff was to review existing curriculum materials. It was hoped that an abundance of materials could be found which would be useful in teaching mathematics in the specified vocational courses. While this was not true, the consultants and staff did locate limited materials for teaching mathematics in vocational education programs. Excellent instructional materials for teaching mathematics are readily available. These should be helpful to the teacher in reviewing basic mathematics skills and as resources in planning instructional strategies.

FORMAT AND TRAINING SESSION

Overview

The materials developed for the project are aimed at assisting vocational personnel who are interested in improving the mathematics instruction currently offered in vocational education. In addition, these materials can improve the visibility of mathematics that is inherent, needed and/or reinforced in selected vocational courses. Competencies for three vocational program areas were analyzed by mathematics and vocational teachers for mathematics content (see appendix). The analyzed courses are:

Business and Office Education

- Accounting
- Office Occupations

Home Economics Education

- Foods/Nutrition
- Personal/Family Living Skills

Marketing and Distributive Education

- Marketing

The training is designed for the workshop format, but because of its flexible nature, may be used in a variety of situations to assist the educator--administrator, teacher or counselor--in identifying particular responsibilities and needs when providing mathematics instruction for the vocational program. This step-by-step process is provided as a guide in implementation.

Objectives

The objectives of the workshop are to assist vocational and mathematics educators to:

1. Recognize the mathematics content included in the identified vocational courses.
2. Conduct a similar training session.
3. Adapt materials for program use.

OUTLINE OF WORKSHOP PROCEDURE

I. Introduction

A. Significance of the Study

B. Purpose of the Study

C. Procedures of the Study

D. Results of the Study

Analyzed Competencies and Findings
Matrix
Bibliography of Curriculum Materials

II. Group Work with the Products

Have participants:

A. Select one of the program areas

B. Select one course and complete Form I

C. Report findings back to entire group

III. Development of a Plan of Action

Have participants:

A. Form appropriate working groups (mathematics and vocational teachers or local director and teachers)

B. Develop a plan of action to be implemented

C. Report back to entire group

D. Listen to other groups and record applicable ideas

IV. Summary

FORM I

PLANNING SESSION (Duplicate as necessary)

Course_____ Competency No._____

Mathematics Skill:

Subcompetency(ies):

Suggested Learning Experiences: (It may be helpful to consider the following questions.)

1. What are specific learning experiences which can be used to help students accomplish the competency you selected?
2. What are specific mathematics activities that could be incorporated in the learning experience which will teach or reinforce the mathematics concepts indicated in the subcompetency(ies)?

FORM II

PLAN OF ACTION (Duplicate as necessary)

Program(s) Areas_____ Course_____

Action Planned	Improvement Anticipated (who, what, when, where, how)

Discussion Point

In what way, if any, would this change teaching in the course/program?

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APPENDIX

Vocational Education Program: Business and Office Education
Course: Office Occupations I, II

COMPETENCY STATEMENTS ANALYZED FOR MATHEMATICS CONTENT
(Competency Goals and Performance Indicators K-2, Vocational Educational Supplement VEC-1980. NC Department of Public Instruction, Raleigh, NC, 1980.)

Office Occupations

001. Analyze the duties, knowledges, skills, and personal traits needed to perform within an office setting of a business.
  01. Identify the types and functions of offices as they relate to the total operation of businesses.
  02. Describe how the type and size of a business determine office organization.
  03. Identify at least five classifications of office workers and list the duties, knowledges, skills, and personal traits needed for each.
  04. Explain the interrelationships of office jobs.

002. Demonstrate basic language skills through oral communications.
  01. Receive callers in a pleasant, courteous manner and direct them to the appropriate person, if necessary.
  02. Select appropriate telephone, telegraphic, mailgram services when given specific examples.
    Math Skill:
    1. Interpret information displayed in tables and diagrams.
    2. Perform operations with decimal numbers.
    Subcompetency:
    1. Interpret charts when given information on telegraphic mailgram service rates.
    2. Multiply a money amount by a whole number or a decimal number to determine the cost of telephone, telegraphic and mailgram service.
  03. Use correct telephone techniques for greetings, referrals, screening, making appointments, routing, and terminating calls.
  04. Place and answer telephone calls that give and receive accurate business information.
  05. Use telephone directories correctly.
    Math Skill:
    1. Given a map which includes nationwide and worldwide time zones, determine time differences between zones.
    2. Interpret information displayed in tables and diagrams.
    3. Add and subtract times given in hours and minutes.
    Subcompetency:
    1. Interpret information displayed in tables and diagrams to select the appropriate types of long distance call.
    2. Interpret information given on a map of time zones and compute time differences in order to place long distance calls at appropriate times.
    3. Interpret information displayed in tables and diagrams in telephone directories to determine savings on long distance calls.
  06. Maintain a record of appointments made through telephone calls, letters, and person-to-person.
    Math Skill:
    1. Collect data and record it in a table or chart allowing proper lengths of time.
    2. Find the difference between two times and the sum of two or more times.
  07. Recognize characteristics of effective oral communication.

NOTE: 1. The listing of mathematics subcompetencies is comprehensive. Appropriate learning experiences should be selected based on student need.
*2. Required mathematics skill indicated in orginal competency statement.
**3. The orginal competency statement is reworded to indicate mathematics skills.

Subcompetency:
1. Collect data and record it in a table or chart, allowing proper lengths of time for appointments.
2. Find the sum or differences of times and organize a calendar of non-overlapping appointments.

07. Recognize characteristics of effective oral communication.

Information Processing

003. Process information in a business using identified procedures.

01. Identify the steps in the data processing cycle.
02. Explain the importance of electronic data processing equipment to business operations.
03. Define the following basic terms in data processing: electronic data processing, data, input, output, memory, source document, and cental processing unit.
04. Explain the following method of processing data: manually, mechanically, and electronically.
05. Calculate manually the following mathematical computations: converting fractions to decimals, converting percents to decimals, figuring percentage of increase and decrease, discounts, markup and markdown, and interest.

Math Skill:
1. Perform operations with fractional numbers.
2. Perform operations with decimal numbers.
3. Change fractions to decimals.
4. Perform operations with percents.
5. Convert percents to decimals.
6. Compute percent of increase or decrease from real world examples.
7. Compute interest based on principal, rate, and time.
8. Determine the reasonableness of an answer.

Subcompetency:
1. Compute discount on a purchase.
2. Use a formula to figure the percentage of increase and decrease.
3. Use a formula t figure markup and markdown.
4. Use a formula to figure interest.

*06. Operate ten-key adding machines and electronic calculators to do basic mathematical computations.

07. Use a transcriber and electric typewriter to prepare mailable letters, reports, and other correspondence according to office production standards.

Math Skill:
1. Use whole numbers to solve problems, both real and contrived.
2. Perform linear measurement tasks and solve related problems.

Subcompetency:
1. Use whole number computations to set tabs, determine margins, and center letters, reports and other correspondence.
2. Use the typewriter scale, determine the size of the stationery.

08. Compose and dictate mailable business letters using a transcriber.
09. Type tables and reports in mailable form using an electric typewriter.
(See 003.07)
10. Type mailable printed business forms using an electric typewriter.
11. Compare the organization of a traditional office setting to that of a company using word processing centers.
12. Compare the cost of the three methods of originating a business letter: shorthand, longhand, or transcribing machine.

**Revised Competency: Compare the cost of three methods of originating a business letter (shorthand, longhand, or transcribing machine) considering salaries, equipment, materials, and other operating expenses.

13. Identify the types of word processing equipment currently being used by businesses.
14. Locate business information using reference and other sources.
15. Demonstrate legible handwriting in preparing handwritten documents.

Interpersonal Skills

004. Exhibit interpersonal skills, work habits, and attitudes that are acceptable in business.

01. Solve human relations problems that might occur in the office during a business day.
02. Work cooperatively with co-workers and supervisors.
03. Demonstrate ability to work independently.
04. Communiate ideas effectively to individuals and /or groups.
05. Listen attentively.
06. Display tact and courtesy in an office setting.
07. Maintain appropriate personal hygiene and appearance.
08. Use materials and equipment and maintain work area in a responsible manner.
09. Follow oral and written instructions correctly when performing job tasks.
10. Describe basic office customs and acceptable social behavior in an office setting.
11. Plan and organize work by setting priorities for performing job tasks.
12. Demonstrate the ability to complete job tasks while working under pressure of time, interruptions, noise, and changing priorities.

Records Management

005. Development concepts about file organization and management.
01. Compare the advantages and disadvantages of each of the four filing systems.
02. Inspect, index, code, cross-reference, and arrange in alphabetical order materials to be filed.
03. Sort, file, and retrieve information correctly using alphabetic and subject file systems.
04. Retrieve information when geographic and numeric files are used.
05. Identify types of filing equipment and supplies used in businesses.
06. Explain acceptable office practices for removing records from the files, transferring files, and retaining files.
07. Explain the advantages of using the following types of micrographics to retain records for a business: microfilm, microfiche, aperture card, and computer output microfilm, (COM).
08. Explain how electronic data processing equipment increases the efficiency of storing and retrieving records.

Reprographics

006. Prepare copies of materials after deciding upon the appropriate process of reproduction in terms of product, cost, and use of copies.
01. Prepare, correctly proofread, and duplicate a specified number of copies, showing efficient operation of a copying machine or duplicating machine.
02. Select the appropriate process of reproduction in terms of product, cost, and use of copies for a particular job.
Math Skill: Compare the cost of two items by finding the unit price of each.
Subcompetency:
1. Determine the cost of copy reproduction based on quantity and use.
2. Comprare the cost of copy reproduction by various appropriate processes.
03. Compare the advantages and disadvantages of the photocopying process.
Math Skill: Compare the cost of two items by finding the unit price of each.
Subcompetency:
1. Determine the cost of copy reproductions by photocopying based on quantity and use.
2. Compare the cost of copy reproductions by photocopying with reproduction by other methods.

Mail and Shipping Services

007. Process interoffice, incoming, and outgoing mail proficiently.
01. Select appropriate mail services so that communication can be sent by the appropriate method in terms of importance, time factor, and cost.
Math Skill:
1. Interpret information displayed in tables and diagrams.
2. Multiply a money amount by a whole number or a decimal number.
Subcompetency:
1. Interpret charts displaying rates for mail services.

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2. Multiply a money amount by a whole number to determine the cost of service.

02. Describe the classes of USA mail and special mailing services.
03. Sort incoming mail and arrange in priority order for employees to handle.
04. Identify duties of an office worker in handling incoming and outgoing mail.
05. Use suggested format of the United States Postal Service for addressing envelopes.
(See 003.07)
06. Prepare and update mailing lists.
07. Chain feed envelopes with proficiency.

Written Commuinications

008. Compose and type in mailable form business correspondence in a clear, concise, and courteous manner.
01. Spell and define selected business terms from a variety of sources.
02. Use correct spelling, grammar, and punctuation in typing business correspondence, reports, business forms.
03. Proofread, edit, and type in mailable form from roughdraft letters, reports and memorandums, carbon copies, envelopes, and enclosures. (See 003.07)
04. Choose from selected sentences or paragraphs the one in each case which best exhibits effective business communications for answers to specific correspondence.
05. Use correct spelling, grammar, and punctuation in composing and typing business correspondence, reports, legal papers, and minutes.
06. Explain how appearance, accuracy, relevance, timeliness, and readability of letters and reports convey an impression of the writer to the reader.

009. Develop interviewing skills that will enable the applicant to be considered for a job of his or her choice.
01. Describe how sources of job information may be used in securing a job in business.
02. Compose and type in mailable form a letter of application and personal data sheet according to given format in response to position available in the area of business.
03. Complete a job application form correctly and legibly. (See 003.07)
04. Demonstrate the ability to apply for a job and to conduct oneself according to acceptable procedures during an interview situation.

Cash Control Systems

010. Process data used in a cash control system correctly.
01. Define selected terms relating to cash control.
02. Endorse checks and prepare deposit slips for a business account.
Math Skill: Perform operations with decimal numbers.
Subcompetency:
1. Count money, add, and record the amount to be deposited on the deposit slip.
2. Endorse a check using restriced, full, qualified or blank endorsement.
03. Prepare checks and check stubs in correct form when given a selected number of invoices to be paid.
Math Skill:
1. Perform operations with decimal numbers.
2. Read and write numerals naming whole numbers through billions.
3. Read and write money amounts in dollars and cents through $1000.
Subcompetency:
1. Prepare a check stub by adding deposits and subtracting the amount of a check in order to keep the correct check book balance.
2. Write money amounts in numerals when writing a check.
3. Write money amounts in dollars and cents using a combination of numerals and words.
04. Reconcile a bank statement of a business correctly.
Math Skill:
1. Arrange numbers in order from small to large.
2. Add or subtract money amounts in dollars and cents.

Subcompetency: Prepare a bank reconceliation statement by arranging checks in numerical order, noting missing checks and computing special charges and adjustments.

05. Identify situations where a voucher check, certified check, bank draft, cashier's check, and money order may be used in making payments for a business.
06. Establish, record payments, and replenish petty cash funds using acceptable office procedures and a calculator.
    Math Skill:
    1. Determine the solution of a real world problem involving the use of small amounts of money by addition.
    2. Perform operations with decimal numbers.
    Subcompetency:
    1. Use addition and subtraction of small amounts of money to establish a petty cash fund, record payments, and replenish petty cash fund.
    2. Establish and record petty cash entries for specific situations.
07. Compose and type in mailable form routine correspondence relating to cash control.
    (See 003.07)
08. Explain the legal ramifications a business must consider when an individual handles significant amounts of money.

Inventory Systems

011. Process data used in an inventory system correctly.
    01. Define selected terms relating to inventory control.
    02. Compare a computerized inventory system to a manual inventory system.
    03. Explain the importance of accurate inventory control to the successful operation of a business.
    04. Explain the interdependence of the inventory function and the purchasing function of a business.
    05. Compare the two basic methods of keeping inventory perpetual and periodic.
    06. Explain why an increasing number of businesses are relying upon automated data processing equipment to maintain inventory control.
    07. Prepare inventory control cards after making comparisons of purchase orders, invoices, and/or receiving reports using a calculator.
        Math Skill: Multiply a money amount by a whole number or a decimal number.
        Subcompetency: Multiply quantity by unit price of an item to determine correct amount to be recorded on the inventory control card.
    08. Make decisions to record stock when given specific information about company policies.
    09. Set priorities for completing the following functions: recording goods received, comparing invoices with purchase orders, and filling requisition requests.
    10. Compose and type in mailable form routine correspondence relating to inventory control.
        (See 003.07)
    11. File inventory control cards using an acceptable filing system.

Payroll Systems

012. Process data used in a payroll system correctly.
    01. Define selected terms relating to payroll.
    02. Compute wages when given hourly rates, piece rates, and commission percentages using a calculator.
        Math Skill:
        1. Perform operations with decimal numbers.
        2. Perform operations with percents.
        3. Perform operations with fractional numbers.
        4. Change percent to a decimal.
        Subcompetency:
        1. Multiply a money amount by a whole number or a fractional number to determine wages based on hourly rate.
        2. Add to find the number of pieces completed.
        3. Multiply the number of pieces completed by the piece rate.
        4. Divide total amount earned for piece work by number of hours worked to determine hourly rate.

5. Change percent of commission to a decimal and multiply the decimal by the total sales to determine amount of commission.

03. Prepare a payroll register for employees based on given information.
Math Skill:
1. Interpret information displayed in tax tables.
2. Perform operations with decimal numbers
Subcompetency:
1. Determine total decductions (FICA tax, income tax, hospitalization, union dues, etc.) using tables.
2. Subtract deductions from earnings to determine net pay.
3. Add to find total earnings and total deductions.

04. Transfer information accurately from a payroll register to employees' earning records.
Math Skill: Add two or more decimal numbers.
Subcompetency: Add the net pay to the previous amount earned to keep a running balance of each employee's earnings.

05. Compare the speed and accuracy of a computer system used for the payroll process to a manual system used for the same process.

Purchasing Systems

013. Process data used in a purchasing system correctly.

01. Define selected terms relating to the purchasing function of a business.

02. Compare the procedures of a business using centralized purchasing versus decentralized purchasing.

03. Use recognized sources of information about suppliers of materials in catalogs, trade directories, and the Yellow Pages when preparing purchase orders and letters of inquires.
Math Skill:
1. Perform operations with decimal numbers.
2. Multiply a money amount by a whole number or a decimal number.
Subcompetency:
1. Compare unit prices of materials from different suppliers and determine the least expensive price for each item to be purchased.
2. Multiply unit price by number of items to be purchased to find the total price.

04. Compute trade, cash, and quantity discounts using a calculator.
Math Skill:
1. Change a percent to a decimal.
2. Perform operations with decimal numbers.
Subcompetency: Multiply the rate of discount given in the catalog by the total amount of a purchase order to determine discount on a purchase.

05. Identify at least three ways an order may be placed with a vendor.

06. Explain how computer systems speed the ordering of materials and supplies needed frequently by a business.

07. Prepare reports in typewritten form that would assist purchasing agents in comparing costs of materials that would be considered for purchase.
(See 003.07)

08. Compile and type requests for quotations in acceptable form when give copies of purchase requisitions.
(See 003.07)

09. Prepare purchase orders in typewritten form after using a calculator to compute extensions.
Math Skill: Multiply a money amount by a whole number or a decimal number.
Subcompetency: Multiply the unit price by the number ordered to determine the extension on a purchase order.

10. Compare purchase orders to corresponding invoices and receiving reports to determine errors in computations, terms, packing, and accuracy of shipment.
Math Skill: Compare two numerals written in decimal form .
Subcompetency:
1. Compare the prices on an invoice to the prices on a purchase order in order to determine if an error has been made.
2. Determine the reasonableness of an answer.

11. Compose and type in mailable form letters of inquiry about vendor materials and letters requesting credit for returned or damaged materials.
(See 003.07)

Sales Systems

014. Process data used in a sales system.
  01. Define selected terms relating to sales.
  02. Explain the dependence of the total operation of a business on sales.
  03. Identify various methods of sales used by businesses.
  04. Explain a statement of account prepared by electronic data processing equipment of a customer.
  05. Select the appropriate method of shipping goods when given specific examples.
  06. Compose and type in mailable form sales letters inquiry letters, and adjustment letters.
  (See 003.07)
  07. Use acceptable procedures in processing a telephone request for products or services.
  08. Handle mail order requests properly by checking for completeness, accuracy, and credit references.
  09. Prepare in typewritten form sales invoices by computing extensions and including all pertinent information.
  Math Competency: Multiply a money amount by a whole number or a decimal number.
  Subcompetency: Determine the total price for each kind of item by multiplying the unit price by the number of items.
  10. Prepare in typewritten form credit memorandums.
  (See 003.07)
  11. Prepare expense reports of a sales representative using a calculator.
  Math Skill: Perform operations with decimal numbers.
  Subcompetency: Compile expense information provided by sales representative and use a calculator to add and find total expenses.

Planning Business Travel

015. Use travel and accommodation services in planning and expediting business trips.
  01. Prepare and type and itinerary in acceptable form.
  (See 003.07)
  02. Compose and type a mailable letter of reservation for a hotel/motel room.
  (See 003.07)
  03. Use a telephone to make airline and hotel reservations by giving clear, concise, and accurate information.
  04. Identify situations when the following types of funds are used to pay travel expenses: traveler's checks, credit cards, personal checks, certified checks, cashier's checks, and cash.
  05. Prepare a business expense report accurately.
  Math Skill: Add two or more decimal numbers.
  Subcompetency: Compile expense information provided and use a calculator to add and find total expenses.
  06. Read airline timetables or a guide to make airline reservations.
  Math Skill: Interpret information displayed in tables.
  Subcompetency: Determine arrival and departure times by interpreting information displayed in a timetable.

Personal Taxes

016. Complete income tax returns correctly.
  01. Identify sources of tax revenue (state, local, county, federal).
  02. Describe the major areas in which tax revenues are expended.
  03. Determine deductible and nondeductible expenses for tax purposes.
  Math Skill:
  1. Use whole numbers and decimals to solve problems, both real and contrived.
  2. Interpret information displayed in tables and charts.
  Subcompetency:
  1. Compute percentage of expenses which can be deducted for medical, business, and other expenses or credits.
  2. Compile information and compute gross income, deductions, exemptions, and credits.
  3. Use tax tables and schedules to determine the amount of income tax which should be paid or refunded.

017. Plan a conference making all necessary arrangements.

01. Edit and type minutes of meetings in acceptable form. (See 003.07)
02. Compose and type accommodation arrangements and followup letters. (See 003.07)
03. Plan an agenda for a meeting according to acceptable procedures.
04. Organize appropriate materials to be used in a meeting.

Vocational Education Program: Business and Office Education
Course: Accounting I, II

COMPETENCY STATEMEMT ANALYZED FOR MATHEMATICS CONTENT
(Competency Goals and Performance Indicators K-12, Vocational Educational Supplement VEC - 1980. NC Department of Public Instruction, Raleigh, NC, 1980.)

Careers in Accounting

001. Explain the type of careers available in accounting and related occupations.
   01. Identify basic reasons for studying accounting.
   02. Identify entry-level accounting positions open to the high school graduate.

The Accounting Cycle

002. Analyze transaction relating to completing a simple accounting cycle.
   01. Prepare a balance sheet when assets and liabilities are given.
      Math Skill:
      1. Perform operations with decimal numbers.
      2. Compare decimal numbers.
      3. Perform conversions between weekly, monthly and yearly amounts
      Subcompetency: Perform operations to find the sum and/or difference in a column of figures.
   02. Use the accounting equation to determine the accuracy of a balance sheet.
      *Revised Competency: Use the accounting equation to compute the accuracy of a balance sheet.
      Math Skill: Perform operations with decimal numbers.
   03. Record opening entries in a general journal.
      Math Skill: Perform operations with decimal numbers.
      Subcompetency: Add decimal numbers to determine if debits equal credits.
   04. Analyze the effects of assets, liability, owners equity, revenue, and expense transactions.
   05. Prepare an income statement when revenue and expenses are given.
      Math Skill:
      1. Perform operations with decimal numbers.
      2. Compare decimal numbers.
      Subcompetency:
      1. Add to find the sums of columns of figures.
      2. Subtract to find the difference in revenue and expenses.
   06. Describe the basic accounting principals of debit and credit for balance sheet accounts.

Maintaining Simple Accounting Records

003. Journalize and post business transactions in appropriate general and special journals and ledgers.
   01. Identify selected accounting terms related to the accounting cycle.
   02. Identify source documents used in recording transactions in a general and cash journal.
   03. Post general and cash entries into appropriate ledger.
      Math Skill: Compare decimal numbers.
   04. Prove the accuracy of a cash journal.
      Math Skill:
      1. Perform operations with decimal numbers.
      2. Compare decimal numbers.
      3. Determine the reasonableness of an answer.
      Subcompetency:
      1. Add to find the sum of columns of figures in the cash journal.
      2. Compare totals to determine the equality of debits and credits.
      3. Determine the reasonableness of an answer.
   05. Prepare a trial balance after proving ledger account balances.

NOTE: 1. The listing of mathematics subcompetencies is comprehensive. Appropriate learning experiences should be selected based on student need.
2. Orginal competency statement has been reworded to indicate mathematics skill.

Math Skill:
1. Perform operations with decimal numbers.
2. Compare decimal numbers.

Subcompetency:
1. Add to find the total of columns of figures of the trial balance.
2. Compare the totals to prove the equality of debits and credits.

06. Prepare a balance sheet and income statement from work sheet.

Math Skill:
1. Perform operations with decimal numbers.
2. Compare decimal numbers.

Subcompetency:
1. Add to find the columns of figures of two statements.
2. Compare the totals to prove the equality of the debits and credits.
3. Subtract expenses from gross income to determine the net income.

07. Compare manual and computer systems in journalizing and posting source document information to appropriate journals and ledgers.

08. Analyze the accounts in a trial balance by preparing a work sheet. (See 003.06)

09. Close revenue and expense accounts correctly.

Math Skill
1. Compare decimal numbers.
2. Perform conversions between weekly, monthly, and yearly amounts.

Subcompetency: Summarize and transfer accumulated amounts in expense and revenue accounts to obtain a zero balance.

10. Explain why some ledger accounts are closed while others remain open.

11. Describe the steps of the accounting cycle by using systems flowchart.

Banking Activities

004. Analyze the transactions and procedures relating to basic banking activities.

01. Prepare checks and check stubs using acceptable accounting practices.

Math Skills:
1. Perform operations with decimal numbers.
2. Compare decimal numbers.
3. Read and write money in dollars and cents through $1,000.

Subcompetency:
1. Add deposits and subtract the amount of a check in order to keep the correct checkbook balance on a check stub.
2. Write money amounts in numerals when writing a check.
3. Write money amounts in dollars and cents using a combination of numerals and words.

02. Endorse checks and prepare deposit slips for a business correctly.

Math Skill:
1. Complete a deposit slip.
2. Endorse a check.

Subcompetency:
1. Count money, add, and record the amount to be deposited on a deposit slip.
2. Endorse a check using restricted, full, qualified, or blank endorsement.

03. Record journal entries needed as a result of reconciling a bank statement.

Math Skill:
1. Perform operations with decimal numbers.
2. Arrange numbers in order from small to large.
3. Prepare a bank reconciliation statement by arranging checks in numerical order, noting missing checks, and computing special changes or adjustments.

04. Analyze the establishing, recording, and journalizing of petty cash entries.

Math Skill: Perform operations with decimal numbers.

Subcomptency:
1. Use addition and subtraction of small amounts of money to establish a petty cash fund, record payments, and replenish petty cash funds.
2. Establish, record, and journalize petty cash entries when given specific situations.

Payroll Systems:

005. Process data used in a payroll system correctly.

01. Define selected terms relating to payroll.

02. Compute wages when given hourly rates, piece rate, and commission percentages using a calculator.

Math Skill:

1. Perform operations with decimal numbers.
2. Perform operations with fractional numbers.
3. Perform operations with percents.
4. Change percent to a decimal.

Subcompetency:

1. Multiply a money amount by a whole number or a fractional number to determine wages based on hourly rate.
2. Add number of pieces completed.
3. Multiply number of pieces by the piece rate to compute amount earned.
4. Divide total amount earned for piece work by number of hours worked to determine hourly rate.
5. Change commission percentage to a decimal and multiply the decimal by the total sales amount to determine amount of commission.

03. Prepare a payroll register for employees based on given information.

Math Skill:

1. Interpret information displayed in graphs, tables and charts.
2. Perform operations with decimal numbers.

Subcompetency:

1. Use tables to determine total deduction, (FICA tax, income tax, hospitalization, union dues, etc.) from an employee's earnings.
2. Subtract deductions from earnings to determine net pay.
3. Add to find total earnings and total deductions.

04. Transfer information accurately from a payroll register to employees' earning records.

Math Skill: Perform operations with decimal numbers.

Subcompetency: Add the net pay to the previous amount earned to keep a running balance of each employee's earnings.

05. Compare the speed and accuracy of a computer system used for the payroll process to a manual system used for the same process.

06. Record and post transactions relating to the processing of payroll records.

(See 003.03)

Accounting Subsystems

006. Identify four accounting subsystems used in many businesses.

007. Compare the difference between the accounting cycle of a merchandising business and one for a service business.

Cash Receipts

008. Analyze transactions relating to cash receipts.

01. Check the accuracy of source documents that are used in recording cash receipts.

Math Skill:

1. Compare decimal numbers.
2. Determine the reasonableness of an answer.

Subcompetency: Compare the amount of a source document (check, receipt) with the ledger account to determine if correct amount has been received.

02. Define selected terms relating to cash receipts transactions.

03. Record cash receipt transactions correctly in a two column general journal as well as a multi column cash receipts journal.

(See 003.03)

04. Post journal entries correctly from a cash journal to two column accounts in the ledger.

(See 003.03)

05. Explain the procedure followed for proving cash when a cash register is used.

Math Skill:

1. Perform operations with decimal numbers.
2. Compare decimal numbers.

Subcompetency:

1. Find the total amount of money in the cash register drawer by addition.

2. Subtract beginning balance from final balance to find cash receipts.
3. Compare cash on hand with cash register tape.

Accounting for a Purchases and Accounts Payable System

009. Analyze the transactions relating to purchases and accounts payable.
01. Define selected accounting terms related to a purchases and cash payments system.
02. Name and describe the source document for journalizing each of the following: purchases for cash, purchase on credit, purchases returns and allowances, transportation charges, purchase discounts, and payments to creditors.
03. Record purchases on account transactions in a purchases journal. (See 003.03)
04. Record cash payments transactions in a cash payments journal. (See 003.03)
05. Describe handling of transportation charges on purchases.
06. Identify and describe the procedures for handling and recording cash payments using a systems flowchart.
07. Identify the control procedures used to account for and store merchandise.
08. Explain how the purchases of merchandise affect net income or net loss.
09. List and explain the principles for the control of purchases of merchandise.
10. Describe the relationship between an accounts payable subsidiary ledger and an accounts payable controlling account.

Sales on Credit and Accounts Receivable

010. Analyze transactions relating to sales on credit.
01. Define selected terms relating to sales on credit transactions.
02. Compare the processing of credit sales to processing cash sales.
03. Record correctly sales of merchandise on credit in a sales journal. (See 003.03)
04. Identify source documents used in making entries in a sales journal.
05. Post entries from a sales journal to the appropriate ledgers correctly. (See 003.03)
06. Prepare a schedule of accounts receivable correctly.
Math Skill:
1. Perform operations with decimal numbers.
2. Compare two decimal numbers.
Subcompetency:
1. Find the sum of unpaid individual accounts.
2. Add the debit side and the credit side of an account to balance of the accounts receivable accounts in the general ledger, then subtract to find the balance of the accounts receivable.
3. Compare the total in accounts receivable ledger with the balance of the accounts receivable account in the general ledger.
07. Compute and record sales discounts at appropriate times and in appropriate journals.
Math Skill:
1. Change a percent to a decimal.
2. Perform operations with decimal numbers.
Subcompetency: Multiply the percentage discount given in the catalog by the total amount of the purchase order to determine discount on a purchase.
08. Post from the cash receipts journal to the appropriate ledgers correctly. (See 003.03)
09. Compare a manual system and an automated system for processing records for sales and accounts receivable.

Preparation of End-of-Period Adjustments and Statements

011. Analyze the transactions and procedures relating to updating accounts by adjustments and preparing balance sheets and income statements.
01. Define selected terms relating to end-of-period adjustments.
02. Describe the procedure that is followed in order to determine the cost of goods sold.
03. Compute cost of goods.
Math Skill: Perform operations with decimal numbers.

Subcompetency:
1. Add to find total of the purchases.
2. Add total purchases to beginning merchandise inventory.
3. Subtract ending inventory from cost of merchandise available for sale to find cost of goods sold.

04. Record adjusting entries. (See 003.03)

05. Prepare a worksheet having the following sections: trial balance, adjustments, income statement, and balance sheet.
Math Skill: Perform operations with decimal numbers.
Subcompetency:
1. Add to find the total of columns of figures of two statements.
2. Compare the totals to prove the equality of the debits and credits.
3. Determine the net income by subtracting expenses from gross income.

Bad Debts and Depreciation

012. Analyze transactions relating to bad debts and depreciation.

01. Define selected terms relating to bad debts and depreciation.

02. Record and post bad debts expense when the direct write-off method is used.
Math Skill: Perform operations with decimal numbers.
Subcompetency: Add decimal numbers to determine total bad debts expense when direct write-off method is used.

03. Record and post allowances for bad debts when the allowance method is used.
Math Skill: Perform operations with decimal numbers.
Subcompetency: Add decimal numbers to determine total allowance for bad debts.

04. Identify three ways of estimating bad debts.

05. Age accounts receivable correctly.
*Revised Competency: Arrange accounts receivable according to billing dates.
Math Skill: Arrange numbers in order from small to large.

06. Record and post depreciation in the appropriate ledger account.
Math Skill: Perform operations with decimal numbers.
Subcomptency: Add decimal numbers to determine total depreciation.

07. Record appropriate information about depreciation on subsidiary ledgers.

08. Analyze a trial balance "adjustment columns" of a worksheet in which accumulated depreciation is included.
Math Skill:
1. Perform operations with decimal numbers.
2. Compare decimal numbers.
Subcompetency:
1. Add to find the total of "Adjustments Columns" of a worksheet.
2. Compare the totals of columns of figures.

Accruals and Deferrals

013. Analyze tansactions relating to accruals and deferrals.

01. Define selectd terms relating to accruals and deferrals.

02. Explain how adjusting entries for accrued revenues and expenses differ from other revenues and expenses.

03. Record and post adjusting, closing, and reversing entries for accrued expenses and accrued revenues.
Math Skill: Perform operations with decimal numbers.
Subcompetency: Add decimal numbers to determine totals for accrued expenses and accured revenues.

Combinations Journals

014. Record the following transactions in a 10-column combination journal:
a. Purchase of merchandise for cash.
b. Purchase of merchandise on account.
c. Sale of merchandise for cash.
d. Sale of merchandise on account.
e. Cash received on account.
f. Cash withdrawal by owner using a drawing account.
g. Correcting entries.
Math Skill: Perform operations with decimal numbers.

Subcompetency
1. Find the sums of each merchandise purchased, merchandise sold, and cash received on account.
2. Total cash withdrawals by owner.
3. Subtract to determine balances.

Data Processing

015. Identify business decisions that are made when converting from a manual accounting system to an automated accountng system.
- 01. Define terms related to manual, mechanical, and electronic data processing systems for accounting.
- 02. Prepare selected accounting forms for use in an automated accounting system.
- 03. Explain how data are prepared for computer systems.
- 04. Explain the flow of work between a computer center and an accounting department.
- 05. Prepare a chart of accounts by assigning numbers to accounts in the general ledger and subsidiary ledger when preparing for conversion from a manual to an automated accounting system.
  Math Skill: Arrange numbers in order from small to large.
  Subcompetency: Assign numbers to accounts and record in numerical order on a chart.
- 06. Identify common language media for a computer system.
- 07. Identify typical ways electronic data processing equipment is used to process data for accounting and management use.
- 08. Explain how a computer follows instructions in processing data for accounting applications.

Accounting for a Partnership and a Corporation

016. Analyze and describe the major differences in accounting procedures relating to partnerships and corporations.
- 01. Define selected business terms related to partnerships and corporations.
- 02. Identify and describe what three capital accounts are used by a corporation.
- 03. Explain how the adjustments for a corporation differ from the adjustments for a partnership.
- 04. Explain how the income statement of a corporation differs from the income statement of a partnership.
- 05. Explain how the balance sheet of a corporation differs from the balance sheet of a partnership.
- 06. Record closing entries for a partnership.
  Math Skill: Perform operations with decimal numbers.
  Subcompetency: Add decimal numbers to determine closing entries for a partnership.
- 07. Record closing entries for a corporation.
  Math Skill: Perform operations with decimal numbers.
  Subcomptency: Add decimal numbers to determine closing entries for a corporation.

Accounting Control Systems

017. Analyze transactions made when using a voucher system.
- 01. Define selected terms relating to voucher systems.
- 02. Prepare vouchers correctly.
  Math Skill: Read and write money in dollars and cents through $1,000.
  Subcompetency:
  1. Write money amounts in numerals when preparing a voucher.
  2. Write money amounts in dollars and cents using a combination of numerals and words.
- 03. Record vouchers in a voucher register and post in appropriate accounts in a ledger.
  Math Skill: Perform operations with decimal numbers.
  Subcompetency: Add decimal numbers to determine total amount of vouchers.
- 04. Prepare checks correctly when a voucher system is used.
  Math Skill:
  1. Perform operations with decimal numbers.
  2. Read and write money amounts in dollars and cents through $1000.
  Subcompetency:
  1. Add deposits and subtract the amount of a check in order to keep the correct checkbook balance on a checkstub.
  2. Write money amounts in numerals when writing a check.

3. Write money amounts in dollars and cents using a combination of numerals and words.

05. Record payment of vouchers, checks, and deposits when a voucher system is used.
Math Skill: Perform operations with decimal numbers.
Subcompetency: Add decimal numbers to determine totals of vouchers, checks and deposits.

06. Identify four typical applications of a voucher system.

07. Explain the advantages of using a voucher system.

Inventory Control Systems

018. Analyze the importance of merchandise inventory control.

01. Define selected accounting terms relating to inventory control systems.

02. Determine the amount of inventory on hand through the use of physical and perpetual inventory.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
Subcompetency:
1. Multiply the number of items by the price of the item.
2. Add to determine the amount of inventory on hand.

03. Prepare stock cards when a manual system method is used for perpetual inventory records.

04. Explain how cash registers and automated data processing equipment are used to prepare perpetual inventory records.

05. Price inventory using fifo and lifo methods of pricing inventory.
Math Skill:
1. Change percent to a decimal.
2. Perform operations with decimal numbers.
Subcompetency: Multiply the cost of the item by the appropriate percentage to determine price.

06. Determine rate of merchandise turnover.
Math Skill:
1. Perform operations with decimal numbers.
2. Perform operations and solve problems using percent.
Subcompetency:
1. Add to find total amount of inventory.
2. Subtact ending inventory from beginning inventory to determine total merchandise sold.
3. Compute percentage of merchandise turnover.

Budgetary Control System

019. Analyze the importance of the preparation of a budget.

01. Define selected accounting terms relating to budgetary control systems.

02. Explain how budgets are used as management guides.

03. Identify sources of data for budgeting.

04. Use income and expense budget figures to prepare reports for managemnt.
Math Skill: Perform operations with decimal numbers.
Subcompetency:
1. Add decimal numbers to determine income and expense figures.
2. Use subtraction to compare amount of income and expense.

05. Prepare a summary cash budget when estimated sales, purchases, and cash payments for expenses are given.
Math Skill: Perform operations with decimal numbers.
Subcompetency: Use addition and subtraction of stated money amounts for estimated sales, purchases and cash payments for expenses to prepare a summary cash budget.

Keeping Tax Records

020. Analyze the importance of keeping tax records.

01. Define selected accounting terms relating to tax records.

02. Record sales tax transactions in a sales journal and in a sales returns and allowances journal.
Math Skill: Perform operations with decimal numbers.
Subcompetency:
1. Add to determine total sales tax received.
2. Add to determine total sales tax returns and allowances.

03. Record property tax correctly in a general journal.
Math Skill: Perform operations with decimal numbers.

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Subcompetency: Add to determine total property tax.

Notes Receivable

021. Analyze accounting procedures used in recording notes receivable.
  01. Identify the advantages of notes receivable over accounts receivable.
  02. Record notes receivable and interest on notes in general journal. (See 003.03)
  03. Compute discounts on a non-interest-bearing notes receivable.
    Math Skill:
    1. Change a percent to a decimal.
    2. Perform operations with decimal numbers.
    3. Perform operations and solve problems using percent.
    Subcompetency: Multiply the rate of discount by the amount of the non-interest-bearing note to determine the dollar amount of the discount.
  04. Record notes receivable correctly in a notes receivable register. (See 003.03)
  05. Calculate and record cash received for notes receivable correctly.
    Math Skill: Perform operations with decimal numbers.
    Subcompetency:
    1. Add to determine total cash received for notes.
    2. Subtract to determine balance.

Work Habits

022. Demonstrate desirable work habits when performing tasks relating to accounting occupations.
  01. Write all numbers, letters, and words legibly.
  02. Follow oral and written instructions accurately.
  03. Adhere to schedules given.
  04. Organize work station for performing tasks efficiently.
  05. Locate errors and correct them.
    Math Skill: Determine the reasonableness of an answer.

Vocational Education Program: Home Economics Education
Course: Personal/Family Living Skills

COMPETENCY STATEMENTS ANALYZED FOR MATHEMATICS CONTENT
(Competency Goals and Performance Indicators K-12, Vocational Education Supplement VEC - 1980. NC Department of Public Instruction, Raleigh, NC, 1980.)

Career Orientation
Value of Purposeful Activity to the Individual
001. Interpret value of purposeful activity to the individual.

002. Recognize factors affecting occupational choices.

Relation of Personal Competencies to Vocational Planning
003. Interpret personal, educational, and financial decisions in vocational planning.
Math Skill:
1. Interpret statistics displayed in tables, charts, and graphs.
2. Perform problem solving tasks.
3. Determine the reasonableness of an answer.
Subcompetency:
1. Interpret employment statistics for various occupations.
2. Interpret data contained in tables and charts regarding current salaries in various occupations.
3. Perform basic mathematical operations using data on educational expenses, family income and other financial resources to determine the reasonableness of attending a particular educational institution.

004. Describe processes in seeking employment.

Creative Use of Leisure Skills in Employment and Service
005. Summarize benefits derived from the creative use of leisure.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
3. Interpret information displayed in tables, charts, and graphs.
4. Understand estimation skills and their applications.
Subcompetency:
1. Compute the weekly and monthly income when paid by the hour for part-time employment.
2. Compute the net earnings from part-time employment when given the income and deductions.
3. Compute the weekly income when part-time earnings are based on piecework or commission.
4. Interpret statistics on the monetary value of volunteer work.
5. Estimate and compute the cost of leisure activities.
6. Keep a record of expenditures for recreational activities and hobbies.
7. Use basic mathematical operations in developing a budget for leisure activities.

PARENTING/CHILD DEVELOPMENT
Preparation for Parenthood
006. Distinguish between myths and realities of parenthood.

007. Identify decision-making factors in family planning.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
3. Interpret information displayed in tables, charts, and graphs.
4. Understand estimation skills and their applications.
5. Perform operations and solve problems using ratio, proportion and percent.
Subcompetency:
1. Compute the monthly and yearly cost of various birth control methods.
2. Interpret statistics on the current cost of having and rearing a child.

NOTE: The listing of mathematics subcompetencies is comprehensive. Appropriate learning experiences should be selected based on student need.

3. Estimate the cost of having a child including pregnancy, delivery, hospital and first year expense.
4. Analyze income to determine the feasibility of having a child.

008. Identify parental responsibilities related to prenatal growth and development.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
3. Interpret information displayed in tables, charts and graphs.
Subcompetency: Compute the cost of a typical diet needed by a pregnant or lactating individual and compare with the cost of a regular diet for the same individual.

009. Identify community resources for information and assistance in family planning, pregnancy and prenatal care.
Math Skill:
1. Perform operations with decimal numbers.
2. Compare decimal numbers.
3. Understand estimation skills and their applications.
Subcompetency:
1. Compare the cost of various sources of medical care during pregnancy, delivery and the infancy period.
2. Compare the cost of various sources of prenatal education and family planning information and assistance.

010. Identify hereditary and environmental influences on human growth and development.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
3. Interpret information displayed in tables, charts and graphs.
4. Understand estimation skills and their applications.
Subcompetency: Estimate the additional expense of having a handicapped child in the family.

Goals, Roles, and Responsibilities of Parenting

011. Identify goals for parenting which focus on maximizing the growth and development of all family members.

012. Identify ways of coping with common problems in adjusting to parenthood.

013. Plan ways of meeting the basic need of infants and for encouraging growth and development.
Math Skill:
1. Perform operations with decimal numbers.
2. Compare decimal numbers.
Subcompetency: Compare the cost of commercial products and homemade items which help promote infant development (crib mobiles, toys, books, etc.).

014. Identify implications for parenting based on the basic needs of children and the areas and stages of growth and development.

015. Apply positive guidance principles and techniques with children.

016. Identify the interactions of the parent-child-situation relationship.

017. Identify community resources available to families for information and assistance with problems related to children.

CLOTHING

Wardrobe Selection for the Individual

018. Identify principles for selection, coordination, and care of personal clothing.

019. Demonstrate basic decision-making skills in purchasing clothing and accessories.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.

3. Compare decimal numbers.
4. Collect data and record it in a table or chart.
5. Understand estimation skills and their applications.
6. Determine the reasonableness of an answer.

Subcompetency:

1. Use basic mathematical operations to prepare a clothing and accessory budget.
2. Estimate the amount of money needed to purchase clothing items for a given period of time.
3. Perform mental and written computations when comparison shopping for clothing.
4. Compare the estimated cost of ready made garments with that of comparable handmade garments.
5. Perform mental and written computations to check the sales price of clothing items.
6. Estimate the cost of an outfit including accessories.

Construction of Clothing for the Individual

020. Select and coordinate appropriate patterns, fabrics and notions.

Math Skill:

1. Determine the length of an object by measuring to the nearest eighth of an inch.
2. Interpret information displayed in tables and charts.
3. Identify vertical, horizontal and oblique lines.
4. Identify intersecting, parallel and perpendicular lines.
5. Identify geometric figures which are symmetrical.
6. Perform operations with decimal numbers.

Subcompetency:

1. Use a tape measure to measure the body and determine the pattern size.
2. Interpret information displayed in a table on a pattern envelope to determine fabric yardage needed.
3. Identify different lines in patterns and judge which are suitable to body proportions.
4. Compute the price of making a garment considering the cost of pattern, fabric, and notions.

021. Select, operate, and care for sewing equipment safely and accurately.

022. Perform basic techniques of garment construction and evaluate projects according to established criteria.

Math Skill:

1. Identify parallel and perpendicular lines.
2. Determine the length of an object to the nearest eighth of an inch.
3. State conditions under which lines are parallel.
4. Perform operations with decimal numbers.

Subcompetency:

1. Use a tape measure of ruler to accurately measure lengths and depths of seams, hems, trims, fabrics, etc.
2. Use devices to measure or form shapes and curves.
3. Measure the straight-of-grain arrow and place it parallel to the selvage of the fabric.
4. Add money amounts to figure the cost of construction of a garment.

CONSUMER EDUCATION AND MANAGEMENT

Availability of Personal Resources

023. Identify available personal resources.

Factors Affecting Consumer Decisions

024. Describe influence of personal values, needs, and goals on consumer decisions.

025. Identify social pressures on the consumer.

026. Identify available sources of credit.

Math Skill:

1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
3. Perform operations with fractional numbers.
4. Change fractional numbers to decimal numbers.
5. Compute interest based on principal, rate and time.

Subcompetency:
1. List credit plans available to the consumer.
2. Compute the interest on a given amount for a specified time and rate using the simple interest formula.
3. Compute the total amount to be repaid on a simple interest loan.
4. Determine the cost of credit when cash price, installment payments and payment period are known.

Organization of Resources to Provide for Demands

027. Interpret processes in making and evaluating consumer decisions.
Math Skill:
1. Interpret information displayed in tables, charts, graphs, and diagrams.
2. Understand estimation skills and their applications.
3. Determine the reasonableness of an answer.
Subcompetency: Interpret information and statistics contained in tables, charts, graphs, and diagrams used in advertisements.

028. Demonstrate management of financial resources to achieve personal goals.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
3. Perform operations and solve problems using ratio, proportion and percent.
Subcompetency:
1. Add money amounts in order to compute weekly or monthly expenditures.
2. Subtract money amounts to compute discretionary income after expenses.
3. Multiply money amounts in order to compute expenditures or income for a given time period.
4. Divide money amounts to compute weekly or monthly income from a yearly income figure.
5. Develop and use a personal financial plan or budget.

FAMILY RELATIONSHIPS

Growth Toward Maturity

029. Describe family contributions to individual development of all family members.

030. Interpret responsibilities and benefits of family membership at various stages of the life cycle.

031. Show awareness of factors affecting individual life styles, personal goals, and values.

032. Describe influence of physical, mental, and emotional growth on personal behavior during puberty and adolescence.

Readiness for Roles in Contemporary Society

033. Interpret social interaction with peers and adults.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
Subcompetency: Plan a budget for a social activity.

034. Summarize personal roles and responsibilities in dating, courtship, and engagement.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
3. Understand estimation skills and their applications.
Subcompetency:
1. Estimate and/or compute the expenses associated with engagement and marriage.
2. Estimate the cost of special activities associated with engagement and marriage.

035. Describe changing male-female roles and responsibilities in contemporary society.
Math Skill: Interpret information displayed in tables, charts, and graphs.

Subcompetency:
1. Interpret statistics and other data which compare the income of men and women.
2. Interpret information and statistics which relate to the financial status of men and women in nontraditional roles.

FOODS AND NUTRITION

Relation of Diet to Health and Appearance

036. Relate nutritional needs of teenagers to health and appearance.

037. Demonstrate use of nutrition principles in food selection.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations and solve problems using percent.
3. Interpret information displayed in tables, charts and graphs.
Subcompetency:
1. Interpret information contained in nutritive value tables, growth rate charts and caloric value charts.
2. Interpret nutrition information (such as percent of RDA) displayed on food lables.
3. Compute the number of calories consumed over a given period of time.
4. Compute to determine if recommended amounts of nutrients and food groups are included in the diet.

Management of Resources in Food Preparation

038. Identify principles of meal planning.

039. Interpret the use of time, energy, and money in the management of meals.
Math Skill:
1. Add and subtract time given in hours and minutes.
2. Perform operations with whole numbers.
3. Perform operations with decimal numbers.
4. Interpret information displayed in tables, charts and graphs.
5. Compare the cost of items by finding the unit price.
Subcompetency:
1. Plan a time schedule for preparing a specified meal.
2. Interpret information contained in tables as to the amount of energy (calories) needed for various activities.
3. Use basic mathematical operations to plan a menu which meets specified budget limits.
4. Compare the cost of food items by finding the unit price.
5. Use basic mathematical operations to plan a food budget for a specified period of time.
6. Compute the cost per serving of certain foods such as a snack food, fast food item or convenience food.

040. Select, use, and care for equipment properly.
Math Skill:
1. Read Celsius and Fahrenheit thermometers.
2. Understand estimation skills and their applications.
Subcompetency:
1. Determine temperatures in food preparation using Celsius and Fahrenheit thermometers and thermostats.
2. Estimate the size and capacity of food preparation utensils and equipment.

041. Identify work space for food preparation.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform measurement tasks and solve related problems.
4. Understand geometric shapes and constructions.
Subcompetency:
1. Conduct an inventory of food preparation items and food to be stored.
2. Estimate the amount of storage space needed in the kitchen area.
3. Identify work centers based on knowledge of shapes.
4. Estimate or measure the work triange needed for efficient and adequate work centers.
5. Measure to determine adequate clearance for doors and drawers.

042. Plan, prepare, and serve selected foods.
Math Skill:
1. Perform measurement tasks and solve related problems.
2. Perform operations with whole numbers.
3. Perform operations with fractonal numbers.
4. Perform problem solving tasks.
5. Understand estimation skills and their applications.

Subcompetency:
1. Identify the unit of measurement commonly associated with various food items.
2. Interpret abbreviations used in expressing quantities in recipes and on containers.
3. Measure liquid and dry ingredients and other food items.
4. Divide or multiply to increase or decrease a recipe.
5. Estimate amount of food needed to serve a specified number of people.
6. Estimate portions which can be obtained from a given recipe.

043. Demonstrate manners for family meals and special occasions.

GROOMING AND PERSONAL APPEARANCE
Management of Personal Appearance
044. Describe cultural differences related to personal grooming.

045. Show awareness of value bases for personal grooming standards.

046. Demonstrate selected techniques in personal grooming.

047. Interpret factors involved in the selection and cost of grooming aids and services.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
3. Compare decimal numbers.
4. Compare the cost of items by finding the unit price of each.
5. Collect data and record it in a table or chart.
6. Understand estimation skills and their applications.
Subcompetency:
1. Compare the cost of grooming items by finding the unit price.
2. Compute the amount spent on grooming (including services such as cleaning garments, hair care) over a period of time.
3. Develop a grooming budget for a specified period of time.
4. Compute the estimated cost of similar ingredients in grooming products to determine the best buy.

HOUSING AND HOME FURNISHINGS AND TEXTILES
Factors Affecting Family Income
048. Identify factors affecting family housing.
Math Skill:
1. Perform operations and solve problems using percent.
2. Apply appropriate formulas.
3. Perform operations with decimal numbers.
4. Compare decimal numbres.
Subcompetency
1. Determine the percentage of family income which should be spent on housing based on a recommended formula.
2. Compare the cost of renting and purchasing a home.
3. Compute incidental cost associated with housing such as repairs, insurance, and taxes.
4. Compare the cost of various forms of housing.

Use of Design Principles in the Home
049. Describe basic principles of art and design in the home.
Math Skill
1. Understand ratio and proportion.
2. Understand geometric shapes and constructions.
3. Understand estimation skills and their applications.
4. Perform measurement activities and solve related problems.
5. Identify symmetrical and asymmetrical or geometrical figures.

Subcompetency:
1. Identify and classify lines and shapes seen in household fabrics, furniture and accessories.
2. Estimate the effect that furnishings and accessories of different size or visual weight has on room arrangement.
3. Estimate scale and proportion needed to coordinate furniture, arrangement and accessories.
4. Create pleasing accessories such as floral arrangements, pillows, etc. utilizing knowledge of line, shapes, proportion and scale.

050. Describe how to arrange furniture for function and beauty.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform measurement activities and solve related problems.
4. Understand estimation skills and their applications.
5. Understand ratio and proportion.
6. Identify symmetrical and asymmetrical or geometrical figures.
Subcompetency:
1. Demonstrate the ability to perform and accurately record the following room measurements:
   (a) Width and length of room
   (b) width, height and location of openings
   (c) exact location of outlets, plumbing and lights
   (d) exact size and location of irregularities
2. Determine the space needed for furniture and various activities.
3. Measure in order to determine possible locations of furniture in room arrangements.
4. Estimate change in existing space with the addition of new furniture.
5. Use a grid and furniture templates to create a pleasing room arrangement.

Care of Furniture, Equipment and Accessories
051. Relate factors involved in the selection and use of household textiles and accessories.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform measurement activities and solve related problems.
4. Compare the cost of items by finding the unit cost of each.
Subcompetency
1. Use basic mathematical operations and measurements to determine the amount and cost of items such as floor coverings, fabrics and paints.
2. Compare the cost of various kinds and styles of furniture, equipment and accessories in order to get the best buy.

052. Demonstrate methods for organizing household storage.
Math Skill:
1. Perform operations with whole numbers.
2. Collect data and record in a table or chart.
3. Perform measurement activities and solve related problems.
4. Understand estimation skills and their applications.
Subcompetency:
1. Conduct an inventory of household items to be stored.
2. Measure large items to determine needed storage space.
3. Total estimated space needed in various parts of the house to determine adequacy of available storage.

053. Describe care of furniture, equipment and accessories.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
3. Compare decimal numbers.
4. Perform operations and solve problems using percent.
Subcompetency:
1. Compare the expense of caring for and repairing furniture, equipment, and accessories of various qualities.
2. Determine the cost of cleaning supplies for a specified period of time.
3. Compute the percentage of the grocery bill spent on cleaning equipment.
4. Compare the cost of renting and buying cleaning equipment.

5. Compare the cost of personally doing selected household tasks with the price of having the work done professionally.

Correction of Safety Hazards In and Around the Home

054. Demonstrate techniques for correction of safety hazards in and around the home.

Math Skill:

1. Interpret information displayed in tables, charts and graphs.
2. Perform measurement activities and solve related problems.

Subcompetency:

1. Interpret statistics relative to accidents, injuries and deaths that occur in and around the home.
2. Measure to insure correct proportions in mixing household and garden chemicals.

Vocational Education Program: Home Economics Education
Course: Foods/Nutrition (Working Title)

COMPETENCY STATEMENTS ANALYZED FOR MATHEMATICS CONTENT
(Competency Goals and Performance Indicators K-12, Vocational Education Supplement, VEC-1980. NC Department of Public Instruction, Raleigh, NC, 1980)

Competencies 042-051 from 7122 Advanced Consumer and Homemaking

Difference in Food Needs of Family Members

001. Analyze factors affecting food decisions.
Math Skill:
1. Interpret information displayed in tables, graphs and diagrams.
2. Perform operations using percent.
3. Perform operations with whole numbers.
4. Perform operations with decimal numbers.
Subcompetency:
1. Use data in recommended food plans and current references to recognize food patterns of families at different socio-economic levels.
2. Calculate the percentage of the food budget spent on items to meet special family needs.

002. Analyze variations in food selection to meet nutritional needs of family members.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
3. Interpret information displayed in tables, graphs and diagrams.
4. Perform operations and solve problems using ratio, proportion and percent.
Subcompetency:
1. Interpret information in tables and diagrams to determine nutritional needs during different developmental stages.
2. Compute total calories needed based on daily activity patterns and compare with total calories consumed.
3. Analyze various menus to determine compliance with Recommended Dietary Allowance guidelines.
4. Compute the cost of meals planned to meet the special nutritional needs of different family members.
5. Interpret data on food labels, containers and charts to compute serving sizes and nutrients needed for special diets.

Use of the Food Dollar

003. Interpret legal aspects of consumer protection in the area of foods and nutrition.
Math Skill:
1. Perform operations with whole numbers.
2. Interpret information displayed in tables, graphs and diagrams.
3. Perform operations and solve problems using ratio, proportion and percent.
4. Perform measurement activities and solve related problems.
Subcompetency
1. Identify mathematical terms and operations used in the Food and Drug Administration's definitions and standards.
2. Interpret common abbreviations used in expressing quantities of food or capacity of food containers.
3. Compare the weights and measurements of various standard packages used for food products.
4. Compare commercial food products to similiar home prepared items as to their nutritional content and cost.
5. Interpret data displayed in tables in consumer publications.

004. Evaluate practices in shopping for food.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
3. Understand estimation skills and their applications.

NOTE: The listing of mathematics subcompetencies is comprehensive. Appropriate learning experience should be selected based on student need.

4. Determine the unit price of an item.
5. Perform operations and solve problems using ratio, proportion and percent.

Subcompetency:
1. Estimate the total cost of a list of food items.
2. Estimate the sales tax on a purchase.
3. Compare the cost of two items by finding the unit price of each.
4. Divide a money amount by a whole number to find the cost of one item when it is multiple priced.
5. Compare the cost of items bought by weight or count to determine the best buy.
6. Calculate the difference between the advertised sale price and the regular price of food items.
7. Check accuracy of cash register tape by comparing it with items purchased.
8. Estimate the cost of future menus by keeping a record of food purchases.

005. Demonstrate skill in the conservation and preservation of selected foods.

Math Skill:
1. Read temperatures from a Celsius or Fahrenheit thermometer.
2. Interpret information displayed in tables, graphs and diagrams.
3. Perform operations and solve problems using ratio, proportion and percent.

Subcompetency:
1. Read thermometers, thermostats and gauges needed in perserving food.
2. Interpret data found in food conservation tables.
3. Calculate the quantity of ingredients needed to yield acceptable products when preserving selected foods.

Advance Food Preparation

006. Interpret changes in foods and nutrients during preparation and processing.

Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Interpret information displayed in tables, graphs and diagrams.

Subcompetency: Compute the difference in selected food items before and after food preparation to determine changes in weight, size, nutrients and calories.

007. Modify quantities and ingredients in recipes for specific use.

Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform operations with decimal numbers.
4. Perform measurement activities and solve related problems.
5. Interpret data displayed in tables, graphs and diagrams.
6. Understand estimation skills and their applications.
7. Perform operations and solve problems using ratio, proportion and percent.

Subcompetency:
1. Interpret data found in tables of measurement and conversion charts.
2. Estimate the yield of different prepared foods.
3. Compute quantities (numbers, servings, sizes) which can be obtained from various standard packs.
4. Convert measurements given in recipes and on package labels in order to use correct ratio of ingredients when reconstituting food items or increasing or decreasing amounts.
5. Use standard ratio of ingredients when creating new recipes.
6. Perform computations needed to modify quantities and ingredients in a recipe.

008. Use specialized and improvised equipment in the preparation and service of food.

Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform operations and solve problems using ratio, proportion and percent.
4. Find the perimeter, area, mass and volume of geometric figures.
5. Interpret data displayed in tables, graphs and diagrams.

6. Perform measurement activities and solve related problems.
7. Understand estimation skills and their applications.
8. Read temperatures from a Celsius or Fahrenheit thermometer.

Subcompetency:

1. Recognize standard sizes used for food preparation utensils and equipment
2. Estimate to determine the correct size cooking utensils needed for a recipe.
3. Determine the capacity of cooking, serving and cleaning utensils and equipment.
4. Determine temperature by reading thermometer and thermostats used in food preparation and kitchen equipment.
5. Use a scale to weigh ingredients and foods.
6. Use mathematical operations to compare the time and cost of using different equipment to perform food preparation tasks.

009. Analyze management of resouces in meal preparation and service.

Math Skill:

1. Interpret information displayed in tables, graphs and diagrams.
2. Perform operations with whole numbers.
3. Perform operations with fractional numbers.
4. Perform operations with decimal numbers.
5. Understand estimation skills and their applications.
6. Perform measurement activities and solve related problems.
7. Perform operations and solve problems using ratio, proportion and percent.

Subcompetency:

1. Use proportions to find the cost of a given amount of an item needed in a recipe.
2. Compute the cost per serving of a recipe when the price of ingredients is known.
3. Estimate amount of food to purchase, prepare and serve per person and for various size groups.
4. Estimate portions of food needed to obtain the desired number of servings.
5. Calculate the cooking time and temperature of various weights of meat.
6. Compare the difference in the mass and volume of food before and after food preparation.
7. Use basic mathematical operations to plan a schedule for a meal considering the starting, cooking and serving times of the items to be prepared.

010. Demonstrate appropriate variations in table service and appointments for specific purposes and occasions.

Math Skill:

1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
3. Perform measurement activities and solve related problems.
4. Understand estimation skills and their applications.

Subcompetency:

1. Estimate and measure space for placement of table appointments.
2. Compute the cost of various numbers and kinds of table appointments.

Competencies 001-014 From 7152, From Advanced Foods/Nutrition

Food Patterns and Customs

011. Analyze regional and cultural differences in food patterns and preparation.

012. Evaluate food fads and fallacies.

Math Skill:

1. Interpret data displayed in tables, graphs and diagrams.
2. Perform operations and solve problems using ratio, proportion and percent.

Subcompetency:

1. Interpret tables to determine calories needed to achieve or maintain desire weight.
2. Compute the number of calories consumed.
3. Compute percentage of nutrients provided by various diet plans.
4. Interpret data found in Recommended Dietary Allowance tables when comparing the nutritional soundness of diet plans.

013. Describe variations in nutritional needs during developmental stages. (See 002)

Technology and Consumer Choices

014. Analyze scientific and technological developments in the food industry.

015. Analyze sources of consumer information and protection. (See 003)

Management of the Food Dollar

016. Analyze budgeting patterns and buying practices in management of food dollar.

Math Skill:

1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
3. Perform operations and solve problems using ratio, proportion and percent.
4. Interpret information contained in tables, charts and diagrams.
5. Understand estimation skills and their applications.

Subcompetency:

1. Add and subtract money amounts in order to prepare grocery lists to stay within a given amount budgeted to food.
2. Determine the dollar amount to spend on food based on a budgeted percentage of the family's income.
3. Compare the percentage of family income for food to that of recommended food plans.
4. Interpret information displayed in tables and charts in order to plan nutritious meals that are within a weekly food budget.
5. Convert weekly expenditures to monthly and/or yearly amounts.

017. Analyze techniques of conservation and preservation. (See 005)

Organization and Management of Kitchen Facilities and Equipment.

018. Demonstrate principles of organization and management for kitchen facilities and equipment.

Math Skill:

1. Perform operations with whole numbers.
2. Perform measurement activities and solve related problems.
3. Understand lines and basic geometric shapes.
4. Interpret data displayed in tables and charts.
5. Add and subtract time given in hours and minutes.
6. Read temperatures from a Celsius or Fahrenheit thermometer.

Subcompetency:

1. Use mathematical operations and equipment dimensions to determine if space is adequate for various work centers.
2. Relate concepts concerning lines and basic geometric shapes to work triangles used in organizing kitchens.
3. Use thermometers, thermostats and meters to monitor and conserve energy usage.
4. Compare amount and cost of energy consumed in various food preparation activities.

Creativity in Meal Planning and Preparation

019. Interpret variations in meal patterns to meet special nutritional needs. (See 002)

020. Demonstate principles and specialized techniques of food preparation. (See 007 and 008)

021. Evaluate management of resources in preparation and service of meals. (See 009 and 010)

022. Demonstate preparation of regional and cultural food specialities. (See 007 and 008)

023. Identify foods for home and community emergencies.

Math Skills:

1. Perform operations with whole numbers.
2. Interpret coded data.

3. Interpret information displayed in tables, graphs and diagrams.
4. Understand estimation skills and their applications.

Subcompetency

1. Estimate the amount of food to keep-on-hand for emergency situations.
2. Interpret dating codes and other information to determine shelf life of various foods.

Career Opportunities in Food Nutrition

024. Identify career opportunities in foods and nutrition.
Math Skill: Interpret data displayed in tables, graphs and diagrams.
Subcompetency: Interpret employment charts and other data to determine average salaries of food and nutrition related occupations.

Vocational Education Program: Marketing and Distributive Education
Course: Marketing (New List)

COMPETENCY STATEMENTS ANALYZED FOR MATHEMATICS CONTENT*

001. Describe the basic content and organization of the Marketing and Distributive Education Program.

002. Explain the value of the Distributive Education Clubs of America (DECA) as an integral part of the Marketing and Distributive Education program.

003. Explain Marketing and its importance.

Math Skill: Interpret statistics displayed in tables, charts, graphs and diagrams.
Subcompetency: Interpret market trend data.

004. Set personal goals.

005. Maintain appropriate personal appearance.

006. Prepare for and complete a job interview.

007. Develop personality traits/work habits important to business.

008. Communicate effectively with customers, co-workers and supervisors.

009. Use telephone in business-like manner.

010. Explain the importance of human relations in business.

011. Work cooperatively with fellow employees, supervisors and management.

012. Recognize that managment, supervisors and employees require a framework of policies within which to operate.

013. Communicate suggestions, progress and problems to managment.

014. Identify purposes of staff meetings and other forms of inter-departmental/company communications.

015. Explain the concept of economics and economic activities.
Math Skill:
1. Interpret statistics displayed in tables, charts, graphs and diagrams.
2. Perform problem solving tasks.
Subcompetencies:
1. Interpret economic statistics.
2. Perform basic mathematical operations using available data to make marketing projections and decisions.
3. Estimate future economic trends and conditions based on available data.

016. Explain the concept of supply and demand.
(See 015)

017. Explain the concept of profit/profit motive.
(See 015)

018. Explain the concept of risk.
(See 015)

019. Explain the concept of competition.

020. Explain the concept of private enterprise and business ownership.

021. Explain marketing functions and related activities.

NOTE: 1. The listing of mathematics subcompetiencies is comprehensive. Appropriate learning experiences should be selected based on student needs.
*2. Competency statements provided by Marketing and Distributive Education Section, Division of Vocational Education, North Carolina Department of Public Instruction.
**3. Required mathematics skill indicated in original competency statement.

022. Explain the nature of channels of distribution.
Math Skill: Interpret information displayed in tables, chart, graphs and diagrams.

023. Explain the concept of market and market identification.

024. Explain the concept of utility.

025. Explain the relationship of business, government and consumers.

026. Explain the purpose and importance of selling.

027. Represent the business favorably to customers and outside business associates.

028. Use merchandise information.
(See 003)

029. Explain the role of special customer services such as wrapping and packaging, mail and telephone services, and delivery services.

030. Identify sources of merchandise information.

031. Determine when to approach a customer to open a sale.

032. Open the sales presentation.

033. Determine customer/client needs and buying motives.

034. Use feature/benefit selling.
Math Skill: Perform problem solving tasks.

035. Demonstrate product.

036. Handle customer/client objections.

037. Close the sale.

038. Use suggestion selling.

**039. Recognize accurate mathematical calculations are essential to profitable business operations.

**040. Solve mathematical problems of addition, subtraction, multiplication, division, and those involving fractions and percentages.

**041. Utilitze and interpret information from tables, graphs and charts.

042. Complete sales checks for cash and charge transactions
Math Skill:
1. Perform operations with whole numbers.
2. Perfom operations with fractonal numbers.
3. Perform operations with decimal numbers.
4. Perform operations and solve roblems using ratio, proportion and percent.
5. Use data depicted in graphical form to solve problems.
6. Interpret information displayed in tables and diagrams.
7. Add and subtract money amounts.

Subcompetency:
1. Use basic mathematical operations with whole numbers, decimal numbers, fractional numbers and percents to compute cash and charge sales.
2. Use basic mathematical operations to compute the price of merchandise being purchased in a lesser quantity than that originally multiple priced.
3. Read federal and state sales tax tables correctly and use the information to speed up mathematical procedures.

043. Operate register/P.O.S. terminal.

044. Accept customer/client checks.

045. Inspect for counterfeit currency.

**046. Make change.

047. Process special transactions essential to offering customer/client services, such as: layaways, COD's, trading stamps, coupons, and refunds/exchanges.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform operations with decimal numbers.
4. Perfom operations and solve problems using ratio, proportion and percent.
5. Use data depicted in graphical form to solve problems.
Subcompetency:
1. Use basic mathematical operations with whole numbers, fractional numbers, decimal numbers and percents to process special customer transactions.
2. Read self-computing scales such as sales tax tables to speed up mathematical procedures.

048. Wrap/Package products.
Math Skill: Understand estimation skills and their applications.
Subcompetency: Estimate amount of wrap needed for different size packages/products.

049. Explain shoplifting prevention policies/procedures.

050. Explain use of purchase order and invoice.

051. Explain receiving procedures.

052. Receive merchandise.

053. Check incoming stock.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform operations with decimal numbers.
Subcompetency: Use basic mathematical operations with whole numbers, decimal numbers and fractional numbers to check incoming stock.

054. Mark stock.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with frational numbers.
3. Perform operations with decimal numbers.
4. Perform operations and solve problems using ratio, proportion and percent.
5. Use data depicted in graphical form.
6. Solve formulas common to various trades.
Subcompetency:
1. Use basic mathematical operations with whole numbers, decimal numbers, fractional numbers and percents:
   (a) to compare merchandise cost.
   (b) to compare transportation cost.
   (c) to figure discounts on merchandise cost.
   (d) to determine the unit price of an item.
2. Read graphs, tables and diagrams to obtain data needed to compare merchandise costs.

055. Explain the nature of reserve, forward and under stock.

056. Explain stock control procedures.

057. Complete the stock count:
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform operations with decimal numbers.
Subcompetency: Use basic mathematical operations with whole numbers, fractional numbers and decimal numbers to complete the stock count.

058. Explain routine security procedures.

059. Explain functions of store maintenance.

060. Explain emergency procedures and safety precautions.

061. Differentiate between merchandise promotion and institutional promotion.

062. Explain the concept of promotional mix.

063. List the purposes of publicity.

064. List the purposes of advertising.

065. Identify the types of media.

066. Identify the parts of a print advertisement.

067. Explain the use of visual merchandising.

068. List the common types of displays.

069. Explain how to assemble, maintain and dismantle displays.

070. Maintain awareness of current business promotional activities.

071. Apply appropriate leadership style.

072. Use time management principles.
Math Skill:
1. Add and subtract times given in hours and minutes.
2. Perform operations with whole numbers.
3. Perform operations with decimal numbers.
4. Interpret information displayed in tables, charts and graphs.
Subcompetency:
1. Interpret information contained in tables as to the amount of time needed to perform various activities.
2. Use basic mathematical operations to plan personal schedule.
3. Use basic mathematical operations dealing with time to organize a calendar of non-overlapping appointments.

073. Plan and organize work.
(See 072)

074. Determine hiring needs.
Math Skill:
1. Interpret information displayed in tables, charts and graphs.
2. Perform operations with whole numbers.
Subcompetency:
1. Interpret personnel data.
2. Interpret data contained in tables and charts regarding current salaries.
3. Perform basic mathematical operations using data to determine hiring needs.

075. Explain techniques for recruiting new employees.

076. Interview/Select new employees. (same as competency 139)

077. Orient new employees.

078. Explain the nature and importance of employee training/human resource development.

079. Select and use the methods of training best suited to individual situations. (same as competency 140)

080. Plan and develop a work force budget and schedule employees. (same as competency 141)
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform operations with decimal numbers.
4. Interpret information given in graphs, tables and charts.
5. Add and subtract time given in hours and minutes.
Subcompetency:
1. Take a given amount of money and determine the number of employees, pay per hour and number of hours each can work.
2. Using a time card or chart, find the number of hours worked.

3. Use the number of hours worked and the hourly pay rate to determine pay.
4. Use basic mathematical operations to develop a work force budget.
5. Make tables, graphs and charts to illustrate a work force budget.
6. Interpret tables, graphs and charts of work force budget to coworkers.

081. Develop a personnel organization plan.

082. Explain the procedure for assigning duties and delegating authority.

083. Give directions for completing job tasks.

084. Conduct staff meetings. (same as competency 144)

085. Explain the concept of staff motivation.

086. Explain ways to build employee morale. (same as competency 143)

087. Evaluate employees.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform operations with decimal numbers.
4. Perform operations with percent.
Subcompetency: Use basic mathematical operations needed to rate employees using various assessment approaches.

088. Handle employee complaints and grievances. (same as competency 142)

089. Identify target markets.
Math Skill: Interpret statistics displayed in tables, charts and graphs.
Subcompetency: Read tables, charts and graphs to interpret consumer demand.

090. Identify and interpret trends and economic indicators.
Math Skill:
1. Read and interpret bar, circle and line graphs.
2. Interpret information displayed in tables and diagrams.
3. Understand estimation skills and their applications.
Subcompetency:
1. Read graphs, charts, and tables to interpret trends and consumer demand.
2. Interpret economic indicators by reading graphs, charts and tables.
3. Use estimation skills to predict consumer buying power.

091. Select appropriate products. (same as competeny 146)
Math Skill:
1. Read and interpret bar, circle and line graphs.
2. Use data depicted in graphical form to solve problems.
3. Understand estimation skills and their application.
Subcompetency:
1. Use and interpret graphical data in unit control records to predict trends such as price lines, colors, types and sizes.
2. Use estimation skills to predict trends such as price lines, colors, types and sizes.

092. Prepare merchandising/buying plans. (same as competency 145)
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform operations with decimal numbers.
4. Read and interpret bar, circle and line graphs.
5. Interpret information displayed in tables and diagrams.
6. Perform operations and solve problems using ratio, proportion and percent.
7. Solve formulas common to various trades.
8. Add and subtract money amounts.
Subcompetency: Use basic mathematical operations with whole numbers, decimal numbers, fractional numbers and percents to set up merchandising/buying plans.

093. Maintin vendor information and select appropriate vendors.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform operations with decimal numbers.
4. Perform opeartions and solve problems using ratio, proportion and percent.
5. Solve formulas common to various trades.
Subcompetency: Use basic mathematical operations with whole numbers, decimal numbers, fractional numbers and percents to determine which manufacturer's discounts and sales terms are the best.

094. Place or cancel routine (re)orders.
Math Skill: Perform operations with whole numbers.
Subcompetency: Use basic mathematical operations with whole numbers to determine the quantity of merchandise to buy when purchasing new merchandise or reordering basic stock.

095. Determine selling price.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform operations with decimal numbers.
4. Perform operations and solve problems using ratio, proportion and percent.
5. Solve formulas common to various trades.
6. Interpret information contained in tables and diagrams.
7. Understand estimation skills and their applications.
Subcompetency:
1. Use basic mathematical operations with whole numbers, decimal numbers, fractional numbers and percents, applying appropriate formulas to compute markups on goods and services to cover costs and to yield a profit.
2. Use estimation skills to determine if markups and profits are reasonable.
3. Use information contained in tables to set prices on goods and services.

096. Maintain inventory system.
(See 057)

097. Interpret profit and loss statements.
Math Skill:
1. Read and interpret bar, circle and line graphs.
2. Interpret information contained in tables.
3. Use data depicted in graphical form to solve problems.
Subcompetency: Use information obtained from graphs, tables and diagrams to interpret profit and loss statements.

098. Explain the concept of marketing strategies.

099. Explain the concept of promotional mix.

100. Coordinte promotional activities.

101. Select merchandise for promotion.

102. Select promotional media.

103. Describe ways to stimulate sales with timely advertising, markdowns, special sales and sales force incentives.

104. Promote through publicity/public relations and personal involvement in community and professional organizations.

105. Write (publicity) news release.

106. Design advertising inserts for mailing.

107. Maintain awareness of competitor's promotional activities.

108. Use last year's advertisements for promotional planning.

109. Explain the importance of cooperative advertising/promotional materials.

110. Develop advertising layouts.
Math Skill:
1 Determine length, width and/or height by measuring an object or drawing.
2. Interpret information displayed in tables.
3. Identify vertical, horizontal and oblique lines.
4. Identify intersecting, parallel and perpendicular lines.
5. Identify geometric figures which are symmetrical.
Subcompetency:
1. Measure to determine appropriate distances for margins, borders, etc.
2. Use tables giving number of letters per inch to determine size of type to use in layout.
3. Apply principles of line and proportion in developing advertising layouts.

111. Explain the use of color in advertising.

112. Explain the use of brands and trademarks.

113. Explain the use of slogans.

114. Check advertising proofs.

115. Coordinate displays with advertising.

116. Plan/schedule displays/themes with management.

117. Determine display locations.

118. Develop color scheme for display.

119. Explain the role of (trade shows) exhibits.

120. Evaluate media/advertising effectiveness.
Math Skill:
1. Perform operations and solve problems using ratio, proportion and percent.
2. Prepare graphs and tables.
Subcompetency:
1. Use ratio, proportion and percent to express the effectiveness of media/advertising.
2. Prepare tables and graphs to help evaluate the effectiveness of media/advertising.

121. Determine entrepreneurship.

122. Explain the concept of risk.
(See 015)

123. Identify the major factors contributing to the success of a small business.

124. List the personal qualitites and skill needed to be a successful entrepreneur.

125. Assess your ability to be a successful entrepreneur.

126. Identify the types of and sources for technical assistance needed by the entrepreneur.

127. Identify the components of and complete a business plan.

128. Identify how the business plan helps the entrepreneur.

129. Explain government rules and regulations affecting the individual entrepreneur and summarize their importance.

130. List the advantages and disadvantages of types of ownership.

131. Select the most appropriate type of ownership for a business.

132. List the costs that must be considered when starting a business.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.

3. Perform opeartions with decimal nubmers.
4. Perform operations and solve problems using ratio, proportion and percent.

Subcompetency:
1. Use basic mathematical operations with whole numbers, decimal numbers, fractional numbers and percents to compile a list of costs that must be considered when starting a business.
2. Use whole numbers, decimal numbers and percents to correctly record and report sales taxes for a business.

133. Identify the various sources for a new business.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform operations with decimal numbers.
4. Perform operations and solve problems using ratio, proportion and percent.

Subcompetency: Use basic mathematical operations with whole numbers, decimal numbers, fractional numbers and percents to analyze credit arrangements for financing a business.

134. Select the best location and layout for business.

135. Obtain information on and select equipment, supplies, etc.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform operations with decimal numbers.
4. Perform operations and solve problems using ratio, proportion and percent.

Subcompetency:
1. Use basic mathematical operations to compare merchandise and transportation cost when purchasing equipment and supplies.
2. Figure discounts on merchandise cost.
3. Compare merchandise cost of various manufacturers and dealers.

136. Explain the role of management in operating a business.

137. Develop company objectives.

138. Establish and interpret general/personnel policies.

139. Interview/select new employees. (same as competency 076)

140. Select and use the methods of training best suited to individual situations. (same as competency 079)

141. Plan and develop a work force budget and schedule employees. (same as competency 080)
(See 080)

142. Handle employee complaints and grievances. (same as competency 088)

143. Explain ways to build employee morale. (same as competency 086)

144. Conduct staff meetings. (same as competency 084)

145. Prepare merchandising/buying plans. (same as competency 092)
(See 092)

146. Select appropriate products. (same as competency 091)

147. Develop/administer a comprehensive, company-wide promotional program.

148. Establish/evaluate credit policies.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform operations with decimal numbers.
4. Perform operations and solve problems using percent.
5. Solve formulas common to various trades.
6. Interpret information contained in tables and diagrams.

Subcompetency:
1. Use basic mathematical operations with whole numbers, fractional numbers, decimal numbers and percents to interpret and explain time payment principles as applied to various credit arrangements.
2. Apply appropriate formulas to interpret and explain time payment principles.
3. Use appropriate formulas to analyze and age credit accounts.
4. Apply appropriate formulas to help determine the best type of account for credit applicants.
5. Use appropriate formulas to interpret monthly billing statements.

149. Identify types of and use records needed for business operations.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with fractional numbers.
3. Perform operations with decimal numbers.
4. Perform operations and solve problems using ratio, proportion and percent.
5. Solve formulas common to various trades.
Subcompetency:
1. Use information obtained from graphs, tables and diagrams to interpret financial data.
2. Determine if data indicate the need for a change in what is being done.
3. Use formulas to obtain needed information for decision-making.
4. Read self-computing scales such as income tax withholding tables and social security tables.
5. Use basic mathematical operations with whole numbers, fractional numbers, decimal numbers and percents to maintain records needed for business operations.

150. Develop protection and emergency plans for a business.

151. Develop company-wide budget.
Math Skill:
1. Perform operations with whole numbers.
2. Perform operations with decimal numbers.
3. Perform operations with fractional numbers.
4. Perform operations using ratio, proportion and percent.
5. Understand estimation skills and their applications.
6. Organize data into table form or graphical form.
7. Read and interpret data depicted in graphical or table form to solve problems.
Subcompetency:
1. Use estimation skills and basic mathematical operations with whole numbers, fractional numbers, decimal numbers and percents to develop a company-wide budget.
2. Make tables, graphs and charts to illustrate various phases of the budget.
3. Interpret graphs, tables and charts of budget to coworkers.

MATRIX

MATHEMATICS COMPETENCY STATEMENTS* / VOCATIONAL EDUCATION COURSES	Personal/ Family Living Skills	Foods/ Nutrition	Accounting I, II	Office Occupations I, II	Marketing
1. Perform operations with whole numbers and use them to solve problems.	16	13	7	9	16
2. Perform operations with fractions and mixed numbers and use them to solve problems.	4	4	1	2	15
3. Compare two or more decimal numbers.	7		9	2	2
4. Perform operations with decimal numbers and use them to solve problems.	17	7	32	16	15
5. Change the form of rational numbers from decimals to fractions to percents, in any order.	1		5	3	
6. Demonstrate an understanding of ratio, proportion and percent and use them to solve problems.	7	10	3	2	13
7. Read, write, perform operations and solve problems with money amounts.	13	5	29	13	7
8. Compute using times given in hours and minutes or as time zones on a map.	1	3	1	2	1
9. Interpret information contained in tables, charts and diagrams.	12	13	1	5	14
10. Make tables, charts and diagrams from given data.	2			1	3
11. List types of credit available.	1				2
12. Compare cost of items by finding unit prices of each.	3	1		3	1
13. Compute average of several numbers.		1			2
14. Estimate sums, differences, products and quotients.	11	5	20		3
15. Perform conversions between weekly, monthly and yearly amounts.	3	1	15		2
16. Use correct formulas at appropriate times.	2	1	1	1	5
17. Determine reasonableness of an answer.	3		3	1	2
18. Perform measurement tasks and solve related problems.	8	5		1	1
19. Perform tasks related to maintaining a checking account.			5	2	
20. Identify sets of lines such as parallel, perpendicular, vertical, horizontal, etc.	2	1			1
21. Identify geometric shapes and constructions.	4	2			1
22. Determine temperature by reading a thermometer.	1	3			

*Based on Mathematics Competency Statements listed in Competency Goals and Performance Indicators K-12. Raleigh, N. C.: North Carolina Department of Public Instruction, 1980.

NOTE: The numerals in the matrix indicate only the approximate number of times a mathematics competency has been identified as having potential for being taught or reinforced in each of the specified courses. Mathematics skill was usually counted at the highest level. The assumption was made that prerequisite skills would be included. This information may be helpful in estimating the emphasis which should be placed on a particular mathematics skill and also as a guide in selecting teaching materials.

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BIBLIOGRAPHY OF MATHEMATICS-RELATED RESOURCE

MATERIALS FOR SELECTED VOCATIONAL COURSES

Curriculum Guides

GENERAL

Elias, John. Mathematics. University of Missouri, Columbia, MO.

Kinsey, Patricia E. Applied Vocational Mathematics. South Carolina Department of Education. Columbia, SC, 1984.

Mathematics in Vocational Education. Developed by Lebanon Union High School, Vocational-Technical Education Department of Oregon State University and Division of Vocational Education, Oregon Department of Education. Marion Education Service District, Salem, OR, 1982.

Santoli, C. M. Basic Vocational Mathematics (Parts I and II), State of New Jersey Department of Education.

BUSINESS AND OFFICE

Martinka, Marie. Vocational Mathematics For Business. Adult-Vocational Division, Milwaukee Area Technical College, Milwaukee, WI.

CONSUMER AND HOMEMAKING

Darnfield, Blanche. Commercial Foods Mathematics-I. Vocational Division-Curriculum Laboratory, New Brunswick, NJ.

DISTRIBUTIVE EDUCATION

Laun, Duane. Competencies and Concepts in Mathematics for Sales and Marketing-Management. Conrad Publishing, Box 29204, Minneapolis, MN, 1979.

Textbooks

GENERAL

Bolater, L. Carey, Woodburn, H. Douglas and Gipson, Joella H. Consumer and Career Mathematics. Glenview, IL: Scott, Foresman and Company, 1978. Reviews basic computational skills with emphasis on career and consumer applications. Intended as consumer math text or second year general math course.

Brown, Charles Clifford. Mathematics for The Real World. (Teachers' Annotated Edition.) 1978. Covers general mathematics.

Fairbank, Roswell E. and Schultheis, Robert. Consumer Math. Cincinnati, OH: South-Western, 1983. Develops competencies necessary to solve math problems that consumers typically encounter.

Gannon, Gerald and Daggett, Willard R. Occupational Mathematics. Cincinnati, OH: South-Western, 1985. Emphasizes analysis and statement of problems, rather than manipulation of numbers. Material related to math problems faced in future occupations.

Hossage, Loyce C. Mathematics Skill Builder. Cincinnati, OH: South-Western, 1985. Provides a thorough review of the fundamentals of mathematics.

Keedy, Mervin L., Bittinger, Marvin L., Smith, Stanley A. and Anderson, Paul A. General Mathematics. Menlo Park, CA: Addison-Wesley Publishing, 1980. Focuses on use of math skills in real-life situations and careers. Applications include writing checks, time zones, budgeting, food values, reading charts, and rates and wages. Careers range from restaurant manager to van customizing and include a range of math problems workers might face.

Kravitz, Wallace W., Brant, Vincent and Reed, Madolyn J. Consumer Related Mathematics. New York: Holt, Rinehart and Winston, 1980. Includes consumer situations necessitating certain math skills. Teachers' guide contains help with special-needs students ranging from mentally retarded to gifted or talented.

Price, Jack, Brame, Olene, Charles, Michael and Clifford, Miriam Lien. Mathematics for Everyday Life (Teachers' Annotated Edition). Columbus, OH: Charles E. Merrill, 1982. Emphasizes problem-solving skills with stress on the underlying mathematics. Real-life applications ranging from coupon clipping to measuring angles and area.

Robinson, Paul and Hauge, Sharon. Math in the Marketplace. Portland, ME: J. Weston Walch. Provides basic skills and problem-solving practice for making better decisions as consumers

and in the world of business.

BUSINESS AND OFFICE

Allen, Warren. Computerized Payroll Procedures. Cincinnati, OH: South-Western, 1985. Introduces computerized payroll procedures. (Textbook workbook and diskette.)

Polisky, Mildred and Meehan, James. Solving Business Problems on the Electric Calculator. New York: McGraw-Hill Book, 1983. Trains students in the efficient use of electronic calculators to solve common office problems.

Wanous, S. J. and Kushner, John A. Statistical Typing With Tabulation Problems. Cincinnati, OH: South-Western, 1980. Provides review and skill-building drills centered around use of figures and symbols and their application to job skills.

Wood, Merle. Payroll Records and Procedures. New York: McGraw-Hill, 1984. Develops both an understanding of payroll principles and ability to perform procedures.

CONSUMER AND HOMEMAKING

Parshy. Mathematics for Family Living Book IV. Mafex. Presents concepts concerning saving and charge accounts. EMR students.

DISTRIBUTIVE EDUCATION

Petrek, Joyce A. Wholesaling Practice Set: Mathematics. Columbus, OH: Ohio Distributive Education Materials Lab, The Ohio State University, 1981. Helps students develop math skills in change-making.

Stull, William A. Marketing Math. Cincinnati, OH: South-Western, 1985. Presents marketing math in a sequence by walking the student through the steps of merchandising.

Activities, Workbooks, Modules

GENERAL

J. Weston Walch Publishers, Cincinnati, OH.

Arithmetic on the Job (Brendd and Morin). Eighteen 11 X 14" posters; cartoon, short commentary about typical job and related math problem.

Challenges in Business Math (Mason). Fifty activities dealing with job-related math problems: unit pricing, payroll earning, markup percents.

Confidence Building Geometry Problems. Twenty-four masters showing the practical uses of geometry.

Consumer Math Success Kit. Resource book with reproducible student pages. Problem-solving from budgets to banking to investments.

Diagnostic Tests for Minimal Math Competencies (Pyrczah and Longmere). Testing materials measure students proficiency in twenty-eight specific math competencies considered essential for successful functioning in daily life.

Estimation Skill Builders (Perry). Twenty-four masters help students apply estimating strategies to figure travel time, etc.

Math in Everyday Life (Newton). Workbook with consumer related forms and math problems everyone must cope with--insurance, fuel and utility bills, car expenses, taxes.

Math for Today and Tomorrow. Student Worktext--typical problems of teenagers, newlyweds--installment buying, insurance, credit consumer tips.

Statistics Simplified (Pyrczah and Bruce). Worksheets with practical applications of statistics in daily life focusing on charts, graphs and figures.

Survival Math Skills (Pyrczah). Photocopy masters reinforce basic math skills through real-life applications such as nutrition, budgeting, borrowing, etc.

Understanding Fractions Through Pictures (Dirkes). Twenty-four masters. Pictorial approach helps students understand fractions, ratios and decimals.

Word Problem Books (Robbins and Hauge). Very basic student workbooks with step-by-step instructions, practice exercises and applications--basic and remedial math.

The Math Group, Inc. 396 E. 79th St., Minneapolis, MN, 1977.

Cutting Corners. Simulation game in which learners earn and spend money while keeping a checkbook. Grades 4 to adult.

BUSINESS AND OFFICE

Abraxas Films, P. O. Box 186, Capitola, CA, 1979.

Computing for a Bill of Materials. Includes instructor's guide, 35 mm and cassette, twenty-four minutes. Defines nominal, actual, finish, and rough size, board, square, and linear feet and their computation.

Kentucky Department of Education, CBVE Instructional Materials, Curriculum Development Unit, Office of Vocational Education, Frankfort, KY.

Bookeeper (Modules BK-3 to BK-59)

Cashier-Checker: Disadvantaged/Handicapped (Modules CC/DH-4-16, 19-20). Contains modules or task assignment, slide/tape and instructor's manual.

McGraw-Hill, New York, 1984.

Skeeter's Pizza Parlor. (Peterson, David R.) Allows students to establish accounting system for a small business, record transactions, prepare financial statement and analyze financial data.

Prentice-Hall, Englewood Cliff, NJ, 1978.

Basic Business Machine Calculation: A Complete Course. (Giordano, Al.) Presents simplified, programmed instructions with realistic business forms, problems and applications.

U. S. Office of Education, Washington, DC, 1979.

The Payroll Grading System. Uses simulation whereby students not only learn the financial operations of a business, but how to accurately keep financial records through payroll grading.

CONSUMER AND HOMEMAKING

North Carolina Department of Public Instruction, 1980.

Prescriptive Consumer Mathematics Laboratory (A Title IV C Project). Modules planned on Taxes, Home Management, Grocery, Travel and Transportation, Insurance, Credit and Banking.

J. Weston Walch Publishers, Cincinnati, OH.

Mathematics in the Home. Cartoon poster series dealing with typical home situations, explanations and problems--borrowing money, energy costs, home improvements, buying car, etc.

Kentucky Department of Education, CBVE Instructional Materials, Curriculum Development Unit, Office of Vocational Education, Frankfort, KY.

Consumer and Family Life Skills (MFE-4-9, 14-16, F-6). Contains module or task assignment, slide/tape, instructor's manual.

DISTRIBUTIVE EDUCATION

Kentucky Department of Education, CBVE Instructional Materials, Curriculum Development Unit, Office of Vocational Education, Frankfort, KY.

Retailing (R-17, 19-20, 28-35). Contains modules, slide/tape, instructor's manual.

South-Western, Cincinnati, OH, 1983.

Machines Simulation. (Pasewark, William R. and Cornelia, Nicholas J.) Develops calculating machine competencies needed for future employment.

Software

GENERAL

Changing Times Educational Service. EMC Publishing, Saint Paul, MN.

Graphing is Fun: Graphs, Their Use and Interpretation.

Personal Mathematics: Math in Our Everyday Lives. Two programs dealing with "Real Cost"

and fractions, percents and decimals using everyday examples. Both APL and TRS.

J. Weston Walch Publishers, Portland, MA, and Sunburst Communications, Pleasantville, NY.

Get to the Point: Working with Decimals. These games expose students to concepts of order of decimals and help with basic operations. Grades 5-9. APL.

Educational Power Drill. Four Programs which reinforce basic computation. Grades 4-9. APL.

Explorer Metros: A Metric Adventure. Explores valuable estimation skills of metric capacity; mass, length and temperature. Grades 5-9. APL.

Survival Math: Simulation. Koetka, Walter. Four computer simulations ("Smart Shopper Marathon," "Hot Dog Stand," "Travel Agent Contest" and "Foreman's Assistant") gives hands-on practice using math skills in real-life situations. Grades 6 and up. APL, COM and TRS.

BUSINESS AND OFFICE

Waterford, Michigan, School District.

The Whatset Corporation: Survival Math Skills. Provides developmental work in business math. Computer simulation of starting and running a one-product business. Grades 6 and up. APL and TRS.